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In this issue . . .

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Tin Supplies—Now and Later

THE new International Tin Council, which held its first series of meetings last week, is faced with two distinct sets of problems—those of the immediate future and of the long term.

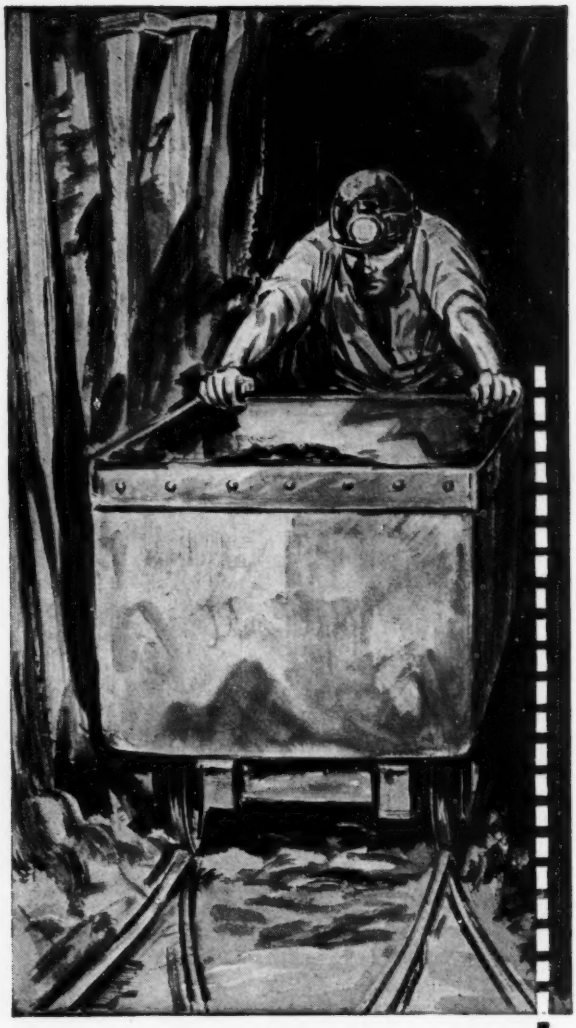
As heir to an already exhausted buffer stock, the new I.T.C. can in the short term in effect do little more than reach agreement as speedily as possible among its members to a formula which might reasonably be expected to prove acceptable to the U.S. authorities as a basis for the release of tin from the strategic stockpile. In the long term, however, the Council has it in its power to take a much more positive and constructive role in the implementation of clause 10 in the tin agreement which enjoins the Council, in the event of a tin shortage, to stimulate the maximum development of production and assure equitable distribution among consumers.

It is only to be hoped that success in solving the short term problem, which may yet take some time, will not anaesthetize the I.T.C.'s instict for long range planning which after all is, or at least should be, implicit in the concept of an international commodity agreement.

To take the short term problems first, let us start by being quite clear that no physical shortage of tin can be said to exist at the present time, nor indeed that it is in danger of developing, even in the absence of stockpile releases, until the early months of next year. This is borne out by the very steady behaviour of tin prices since the market's tactical pre-emption of the buffer stock during June.

To see that there is no reason to expect any imminent price rise, it is only necessary to recall that consumer stocks were generally at a high level at the beginning of this year with some at least of the big American users believed to be once again carrying about twelve month's requirements. About 15,000 tons still seems to be the most popular estimate of the 1960 short-fall of production plus Russo-Chinese exports over Free-World consumption—say a deficit of 5,000 tons after taking the buffer stock of 10,000 tons into account. Nearly all of this should be met by the release of the 4,000 tons of Texas smelter stocks held outside the strategic stockpile, while the balance is likely to be met partly by destocking and possibly by an increase in the rate of release from Canadian and Italian stockpiles to their domestic markets.

It is too early to speculate with any precision about the size of the 1962 deficit, although the improvement, which is already manifest in Malayan and Thai exports, is likely to progress with the re-entry of high cost producers and the cessation of smuggling to China which presumably followed the ending of quotas. Less quickly, but with fair certainty, we can count on a revival in Bolivian production, partly in consequence of higher prices and partly in consequence of Washington's $10,000,000 loan for the



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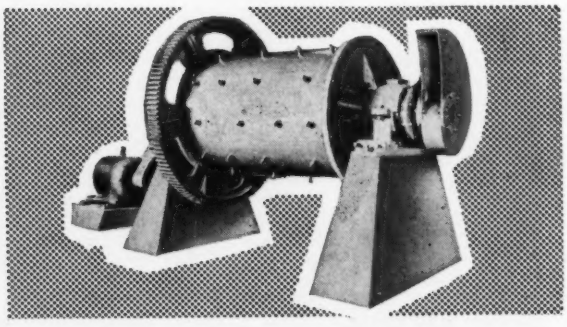

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rehabilitation of her mines. Similarly, given the right combination of foreign aid and domestic political priorities, Indonesian production could rise appreciably over the next few years. Finally there is the Congo which under normal conditions would have been good for 10,000 to 12,000 tons annually and from which at any rate the first trickle of accumulated production may reach the market towards the end of this year.

Against all this must be set the probability that the impending revival in U.S. industrial activity, coupled with the continued vitality of Continental economies, will make appreciably larger demands on tin producers next year. Even so, there seems to be no reason, short of the Congo failing to re-enter the market on any scale, to anticipate that the deficit in 1962 will be very different from this year.

Nevertheless, whether the deficit is 5,000 tons or 20,000 tons there can be no buffer stock support next year nor does the industry appear to anticipate any increase in the rate of Russo-Chinese exports which at the moment are thought to be running at an annual rate of about 5,000 tons. Market stability in 1962 is thus entirely dependent on how soon and on what terms the U.S. strategic stockpile is made available.

The answer to how soon is dependent first upon how quickly the I.T.C. can come to an understanding with President Kennedy's Administration. This in turn is a function of reconciling conflicting views within the Council on a basis which would then permit Washington to act without appearing to harm the interests of any countries which are members of an agreement to which she is not a party. Thereafter it all depends on how quickly the enabling legislation can be put through Congress. As the next meeting of the I.T.C. is not until August 22, Congress approval to any arrangement can obviously not be sought before then. Habitually Congress rises well before this date, but the new Administration has a heavy legislative programme on the stocks, which, it is thought in some quarters, may keep Congress sitting until September. It is thus possible that Congress could deal with the matter before rising, although recent reports from Washington suggest that the preliminary consultations could be prolonged.

If Congress approval could be obtained this session, the risk of a physical tin shortage would in any event be averted. If, however, approval is not forthcoming before late January or early February, the position would then become critical if we accept the popular assumption that it will in fact take six months for G.A.T.T. approval to the release to become effective. There is, however, some real doubt whether machinery does not in fact exist whereby this period can be cut to 45 days, in which case stockpile tin might be available before the end of March which would be equivalent to additional Eastern production becoming available in January.

All in all the danger of American or European tin users running out of tin in the short term seems slight, as indeed the present behaviour of the tin price confirms.

It remains to consider the conditions under which Washington may be expected to agree to stockpile releases. In the first place, it is a reasonable assumption that the I.T.C. expects agreement to be reached with Washington in principle before August 22. The problems at issue have been under informal discussion for so long now that it would be senseless for the I.T.C. to make the formal approach, which has now been announced, if the outcome was in serious doubt.

The three principal points to be settled are, first, the price level below which stockpile tin will not be released; second the limits, if any, to be placed on the tonnage releasable in any given period; and, third, the method of disposal.

On the question of price, it seems probable that the I.T.C. will have to agree to raise its existing floor price to a point which will both guarantee a larger return to the nationalized tin industries of Bolivia and Indonesia, one if not both of which are now working at a loss, and which will also provide the necessary incentive to high cost producers in other countries to resume operations.

However, a more immediately crucial point for agreement is the price level below which stockpile releases will be withheld. This involves a reconciliation of Bolivian and Indonesian cries for "more" with the views of consumers inside and outside the U.S.A. no less than with those of other producer countries, who fear substitution at extravagant prices.

In this context of what is a "right" price it is extremely pertinent that, in time for the next I.T.C. meeting, producer countries have been asked to submit details of production cost levels and break-even points. This being so, it is to be hoped that at the same time consumer interests will also be prepared to indicate the price levels at which substitution is likely to become effective for various tin uses.

The second point to be agreed is whether any limit will in fact be imposed on the rate of release from the stockpile. From one point of view, it can be argued that a minimum selling price will in itself be sufficient to cut off supplies beyond market requirements. On the other hand, unless the minimum release price were set at a punitively high level, to place no limit on the rate of release would be tantamount to pegging the tin price at this minimum stockpile selling price, and would bring all normal market procedure to an end.

The third point which the I.T.C. will have to clarify is the machinery by which the stockpile is to be marketed. It is only common sense to assume that in practice this will be disposed of to American users to reduce unnecessary transportation costs, and as it would require a change in the present tin agreement for the buffer stock manager to market tin of which he does not have physical possession, he seems unlikely to be the instrument of disposal, as he was with British government stocks. American stockpile legislation is believed to require that stockpile releases be disposed of by public tenders which are thus likely in practice to be confined to bids from American users and dealers.

Next, what are the I.T.C.'s long term problems?

The clause in the tin agreement which enjoins the I.T.C. to stimulate the production of tin in times of shortage, is one about which the Council can do little in the short term other than by tempting the marginal producer by higher prices up to the limit of the consumer's patience and the onset of substitution. On the other hand, the I.T.C. is, in theory at least, in a position to generate the long term initiatives needed to restore an equilibrium between supply and demand, which no single country or section of the tin industry can hope to achieve in isolation.

It remains to be seen whether the present structure and constitution of the Council are such as to produce the sense of urgency as well as the imagination which the problem demands. The answer will, in any event, become apparent quickly as it is basic to the situation that remedial action should begin at once. Even if a full scale attack on the twin problems of production and conservation were to start today, the intensity of prospecting, technical research and mine development which needs to be done to secure present production levels into the future, let alone expand them in line with present consumption trends, are unlikely to bear much fruit inside of a decade.

We hope to revert in some details to these long range problems in a later issue. Meanwhile as the new Council

embarks on its five year term, it is as well that we should all be clear as to their general nature.

On the technical front, nothing will suffice short of an all out effort to identify new tin deposits, or alternatively to enable us to conclude definitively that the world's remaining tin reserves are strictly limited. Either way the I.T.C. must know the answer as, in the latter case, the sooner it begins to encourage the use of substitutes in areas of tin usage in which this metal can most readily be dispensed with, the better.

No less necessary than prospecting is further research into better methods of tin winning whether in the direction of deeper dredging and lower tin recovery losses, or in the direction of developing lower cost mining methods and estimating the capital expenditure needed to achieve them, or in the direction of improving tin conservation in use. Equally urgent is a study of what can be done to improve the personal efficiency of tin miners who at present either through lack of education and training or because of adverse working conditions, are achieving less output than need be the case even with the equipment they have. Inevitably, this study must overlap into the political sphere in studying the relationship in various countries of the organized tin worker to his industry and to his government.

Far more important, however, than these technical studies is the analysis that needs to be made of the inhibiting effect upon private enterprise of the existing pattern of tax and mining laws as well as of the political factors which understandably discourage private enterprise from putting further capital at risk today in countries such as Bolivia, the Congo or Indonesia.

Finally, to the extent that private enterprise cannot be mobilized to provide the world with the tin it needs, it must clearly devolve upon the I.T.C. to mobilize governmental finance, to which purpose the present trend towards increased aid for underdeveloped countries seems readily to lend itself. Such aid would need to be both at the finance and technical level and to involve both the relatively small capital investment required for survey finance and the very much larger investment to exploit the deposits which are discovered.

Up to now, the I.T.C., whatever its shortcomings, has shown a happy knack of getting private enterprise to work harmoniously and effectively with governments within a United Nations' framework. In the years ahead, it should have every opportunity for giving further evidence of this facility in the process of bringing the resources of the investor and tax payer alike, to bear on the problems of producing more tin or, should this prove impossible, then on the problems of making do with less.

WHICH TUNE WILL KAUNDA PLAY?

Born of ingenuity out of expediency, the British Government's new constitution for Northern Rhodesia is based on a highly complex formula designed to provide, if not a bridge, at any rate a stepping stone between the impatience of the Africans and the caution of the Europeans, while making it impossible for extremist parties of either race to win an election. It was well nigh a foregone conclusion that acceptance by Sir Roy Welensky, however grudging, would mean automatic rejection by Mr. Kaunda's United Federal Party and this has duly occurred.

Mr. Kaunda, who has been granted emergency powers by the party, is reported to be planning a passive resistance campaign which, in his own words, will "shake the very foundations of the British Government" and "crack every part of the Rhodesian Federation". Apart from the fact that the campaign is to be non-violent, we are given no indication as to how he proposes to achieve these aims nor what, precisely, is intended by the first of these threats, which was presumably made for the purpose of impressing his own followers rather than with any view to world-wide publication.

In our issue of March 3, 1961 p. 233, we discussed the possible consequences of failure to find acceptable solutions to the constitutional problems of the Central African Federation and its component territories. As we then pointed out, the Northern Rhodesian mining groups with their liberal outlooks and progressive policies should be quite capable of co-operating harmoniously with a government dominated by Africans, while the importance of the mining industry to Northern Rhodesia's economy is likely to be fully appreciated by any future government of whatever racial composition.

At this point, it would be premature to assume that the U.N.I.P.'s refusal to have anything to do with Northern Rhodesia's new constitution is necessarily final or that the British Government's efforts to preserve the Federation are foredoomed to failure. In the next act, however, it is Africa rather than Whitehall that will hold the stage.

Study of the present situation suggests that three possible courses of action are open to the U.N.I.P. In the first place, it should by no means be assumed that the party's "total rejection" of the constitutional proposals is as binding as it sounds. Mr. Kaunda's more intransigent statements may simply be part of an act intended to consolidate his own position as party leader, and it could well be that, when the time comes candidates will be put up for election under the constitution which is now being so scornfully rejected. Mr. Kaunda would not be the first African leader to adopt such a course. Pressure for a further constitutional advance could then be exerted within the Chamber. Secondly, Mr. Kaunda and group might decide to remain quiet for the time being and boycott the elections when they took place, though it is hard to see what they could hope to gain from such a purely negative policy.

It is also possible that the U.N.I.P. might endeavour to force the pace of constitutional advancement by persuading the African Mineworkers' Union to organize a strike which would shut down the whole of the Copperbelt.

Of these three alternatives there can be little doubt that the first is the most statesmanlike and potentially rewarding policy; the second has little to commend it from any point of view; while the third could conceivably backfire on its organizers owing to lukewarm support from the African miners themselves.

While the possibility of action affecting the mining industry cannot be entirely ruled out, it seems highly improbable that Mr. Kaunda would seek to use the trade union machinery for purely political ends, if only because members of the union are drawing good wages and are unlikely to have much enthusiasm for a strike which could put nothing more in their pockets and might take a great deal out. Mr. Kaunda himself is one of the more sensible African leaders and knows very well that the prosperity of his own people is inseparably linked with that of the copper mines. He has, in fact, stated that he would only call a national strike in Northern Rhodesia as a last resort. It remains to be seen if he has sufficient control over his own followers to prevent the less responsible elements from calling the party tune. Moreover, the African United Trade Union Congress is reported to be apparently determined to start a strike campaign, if necessary, independently of U.N.I.P. Experience elsewhere in Africa suggests, however, that even with the wilder men at the helm there would be little danger of any serious attempt being made to shut down the mines, though the possibility of temporary interruptions during periods of tension cannot altogether be disregarded.

Colliery Mechanization in the U.S.S.R.

ABOUT 2,300 cutter loaders of various types are now working in the coal basins of the Soviet Union, mechanizing coal-getting and coal loading.

Giving these figures in a report to a scientific conference of mining scientists, held in Dniepropetrovsk, Vladimir Khtrin, chief specialist of the U.S.S.R. Council of Ministers' State Committee for Automation and Machine Building said, "The Donbas cutter loader, invented by Soviet specialists for mechanised coal production in sloping and inclined seams from 2 ft. 6 ins. to 9 ft. thick, is being used on a very wide scale". He added that it was claimed to be the first machine in the world which solved the complex problem of mechanising the arduous process of loading coal on to transport at underground faces. Besides the U.S.S.R., the mining industries of China, Czechoslovakia, Rumania, Hungary, Poland, Bulgaria and a number of other countries are successfully using these machines. Poland and China have acquired licences for the manufacture of this cutter loader.

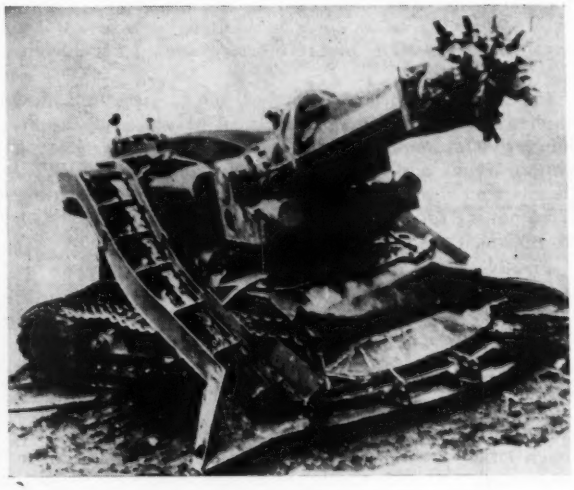
Soviet miners in the Donets coal basin established a world record by producing 45,859 tons of fuel a month by means of a single Donbas cutter loader. The Gornyak cutter loader is successfully being used on sloping coal seams from 24 to 33 in. thick. It has considerably eased working conditions on underground faces and has increased the productivity of labour.

Nikolai Samoilyuk, M.Sc. (Technology) of the State Institute for Coal Machinery Designing, has enlarged on this information. Mr. Samoilyuk has contributed the following.

The processes of coal cutting and breaking, conveying it on the coal faces and trucking in underground workings in Soviet mines, had been mechanized by 1957. The Coal Industry Section at the Soviet Exhibition at Earls Court features technical appliances employed at stoping and development faces, in sinking vertical shafts, as well as for conveying minerals and improving the safety and working conditions of miners.

At the present time, work is under way in the U.S.S.R. to mechanize other processes of winning coal. By 1965 the level of mechanization is planned to reach 67.5 per cent for coal loading, 65 per cent for stope supporting, and 85 per cent for mining operations proper.

Integrated mechanization of all processes at the faces is the main direction of the mechanization of stoping operations in the Soviet coal industry. For various rock conditions special equipment sets have been designed consisting of a stoping machine, a conveying mechanism and a special system for propping stoped space. The key feature of such units is dispensing with the miners' presence at the face for controlling mechanisms. Such mining machines not only provide the most favourable conditions for miners who remotely operate them from a control panel located in the

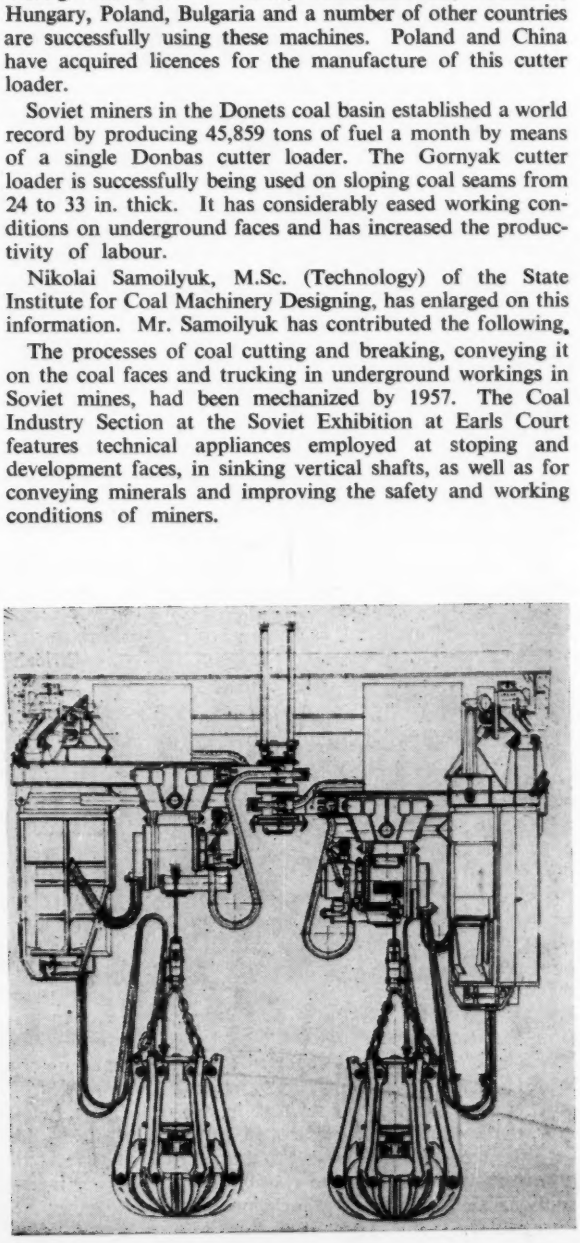


drive, but are also highly productive. Two such units, namely A-2 and A-3, are on display in London.

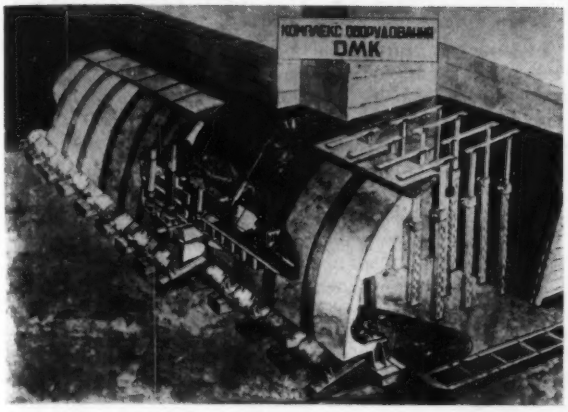
The A-2 unit is designed to operate in faces 50 to 90 yards long on flat seams 2½ to 6 ft. thick, with wall rocks of average rigidity. In addition to the stoping machine the unit includes a mobile double chain flight conveyor and advancing hydraulic roof supports. The pump set of the unit is located within a bay in the tramming drift. A magnetic separation station is also in the drift.

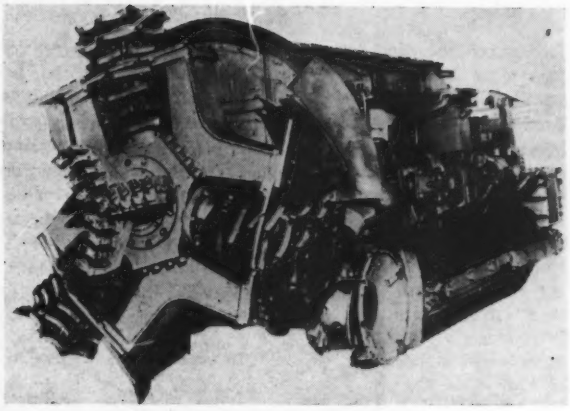
The A-2 unit has a rated daily capacity of 800 tons on a two-shift operation basis and provides advancement in a 65 yd. face by 6½ to 9 yds.

The A-3 unit is designed for operation at faces on flat seams 5-7 ft. thick with a weak roof and soft floor. It comprises a frontal cutting-and-conveying part consisting of a number of single-tooth planes fitted to a laminated chain moving in a ring and advancing hydraulic props. The movement of the unit in the direction of the heading face is achieved by means of horizontal hydraulic jacks. The A-3 unit comprises a wheeled scraper reloader which operates in the drift and advances together with the unit. The re-



At left alongside, the KS-2U universal shaft loading machine for shafts 7-8 metres inner diameter. Above, on this page, the PK-3 tunnelling machine





loader frame mounts a pump set and a magnetic separation station.

Besides the A-2 and A-3 units at the Exhibition in London, two sets of machines also featured are—KM-87 and OMKT —designed for mechanization of stoping operations.

The KM-87 unit includes a narrow-swath combine, a mobile flight conveyor and hydraulic roof supports. The unit is designed for operation at faces up to 200 yards long on flat seams from 3 to 5½ ft. thick and is capable of providing on a two-shift operation basis daily extraction of about 500 to 750 tons of coal. Roof supports are supplied as the unit extracts coal and advances towards the face. The conveyor is re-located after a coal strip in a seam has been removed. The mechanism for conveyor re-location comprises a system of double-action hydraulic jacks connected on one side with the conveyor and on the other with frame sections of roof supports.

The OMKT unit is designed for operation in flat seams 5½ to 8 ft. thick at faces up to 65 yds. long. It has the following main parts: hydraulic roof supports with combined supporting frames, a mobile double-chain flight conveyor and a narrow-swath combine. Rated capacity is 600 tons.

A feed mechanism with hydraulic drive has already been used in the Soviet coal extracting machines (for instance in the LGD cutter-loader) for a considerable period of time. This type of feed mechanism provides infinitely variable control of feed speeds. Lately a new GPCHA hydraulic feed mechanism with automatic control of feed speeds has been designed and tested in the industry. This mechanism is also on display at Earls Court. The GPCHA feeding mechanism installed in coal combines or cutters permits the automatic control of the feed speed, depending on coal hardness and thus provides a steady performance of an electric motor at the required load characteristics.

Among the Soviet sinking machines on display there are also PK-3 and PKG-4 tunnelling combines and a KC-2U machine used at vertical shaft sinking.

The PK-3 tunnelling combine is used for graded and ungraded mine opening operations mainly at mixed type faces of 6 to 10 sq. yds. cross-section with separated extraction of coal and waste and at faces of up to 17 sq. yds. cross-section where two passes are made. The PK-3 combine advances in horizontal level coal seams up to 6½ yds per hr. and 4½ yds. in rock. The average monthly rate of tunnelling with the PK-3 combine is up to 300 yds.

The PKG-4 tunnelling combine is designed for mine opening operations at hydraulic mines where it is employed for making arc-shaped tunnels of 3 sq. yds. cross-section as well as for section air headings, counter levels, storage drifts and break-throughs. Besides coal heading, the combine can drive a level at faces of different type with mixed strata and in fairly soft rocks. At one mine the PKG-4 combine has advanced 1,580 yds. per month.

The KC-2U machine is a multi-purpose muck loader used in those cases when the borehole drilling and blasting method is employed for sinking vertical shafts with 16-27 ft. inner diameter. The machine is equipped with a six-jaw pneumatic grab either of 14 or 22 cu. ft. capacity. The grab is raised by a radially moving telpher. One or two sets of such grabs can be mounted depending on a shaft diameter. Application of the KC-2 machine accounted for establishing in the U.S.S.R. in 1959 a claimed world record for rapid sinking of vertical shafts.

In the Soviet Union, coal in mines is mainly conveyed by chain-conveyors. Several types of such conveyors are featured at the Exhibition in the set of the A-2 narrow-swath cutting unit and also in the sets of the KM-7 and the OMKT machines. A double-chain swinging conveyor is the main type of conveyor which is used in the Soviet coal industry at mechanized longwall faces. The conveyors are usually arranged according to a generally adopted scheme, i.e. with several driving units stationed at the opposite ends of each conveyor. Each driving unit is equipped with special turbo-couplings. The conveyor is driven through a chain-pulley drive which consists of O-shaped chain links made from either .56 in. or .74 in. section rod-iron, the link pitch being correspondingly 2 in. and 2½ in. The capacity of such conveyors at faces is about 250 tons per hour and the aggregate capacity of driving units in one conveyor is 160 kW. Conveyors are re-located by means of an arrangement including separate hydraulic jacks powered by electric motors and a system of hydraulic jacks with pressure supply from one pumping unit.

Alongside the general extension of conveyor haulage on level and slope workings, hydraulic haulage is being introduced in the Soviet coal industry. One of the hydraulic haulage installations is shown at the Earls Court Exhibition.

Among other exhibits featured there are also various blast-hole drilling and blasting equipments, a high head pump, an automatic control system for emptying and returning cars in a tipple, as well as safety appliances and communication facilities.

Above, at top of page, on left, an illustration of the O M K unit At top of page on right, is shown a PKG-4 tunnelling machine

Opportunities for Industrial Development in Western Australia

IN October last year a team of nine British industrialists, led by J. O. Knowles, a director of Metal Industries Ltd., visited Western Australia at the invitation of the State Government. They have prepared a comprehensive report which, it is felt, should be a means of drawing the attention of U.K. industrialists to a vast area of the British Commonwealth, enjoying abundant resources and a growing European population, which now awaits further development.

Compared with the Eastern States, Western Australia is 2,000 miles closer to Europe and to the expanding markets of Asia and Africa. It has an important industrial future.

Western Australia's mineral resources are obviously substantial, states the report, and by no means adequately prospected. There are big reserves of iron ore and manganese. Millions of tons of ilmenite, rutile and zircon lie almost on the surface, close to the seashore. Unexploited metals include caesium, rubidium, thorium and germanium. On the Collie coalfields there are, in addition to deep-mined coal, 40 ft. seams in an open cut. The numerous minerals exploited include lead, talc, copper, bauxite and, of course, gold; 78 per cent of Australia's total gold production is mined in Western Australia. There are also building materials such as limestone and clay, the world's largest blue asbestos deposits, and gypsum. Oil was struck in the north-west some years ago, but so far has not developed into a productive field. Western Australia, however, is proud to have at Kwinana the largest oil refinery in Australia.

Processing of Mineral Resources

The value of mined minerals other than gold and coal was about £A6,000,000 in 1959. The report points out that there is little or no cheap labour in Western Australia and that raw material prices are influenced by conditions throughout the world. It is concluded that efforts should be made to develop the further processing of minerals and other materials before they are exported. Capital, know-how, efficient manufacturing plant and market research are all required to achieve this aim. The development of the chemical industry along lines suggested in the report would help to give a lead in this respect.

Iron and steel imports are chiefly supplied by the Eastern States, but Western Australia in 1959/61 exported iron ore to the value of £A801,000, pig iron worth £A861,000, and manganese ore worth £A1,018,000. In addition to the existing Broken Hill Proprietary merchant mill at Kwinana, the Western Australian Government has come to an aggrement with B.H.P. on the establishment of an integrated iron and steel plant at the same location which, together with mine developments, will involve the company in an expenditure of £A45,000,000.

Western Australia produced gold valued at £A13,600,000 in 1958/59. Two members of the team visited the goldfields at Kalgoorlie. They found it difficult to suggest any development that could take place there, but recognised the feeling of anxiety among the officials in this inland mining town which has to "import" its water and is dependent on a single industry, a world price, and the "working life" of the gold deposits. It would seem that there is some scope for the local processing of gold.

A project for making nitrogenous fertilisers in Western Australia stands out from other chemical projects not only by the certainty of future demand but also because of the very favourable raw materials situation. The Collie coalfield is located in the middle of the agricultural area most likely to be developed intensively, and with good access to a seaport. It might be possible, granted a confirmation of low coal prices and technical suitability of the coal and the site, to envisage the project for export, without waiting for demand to arise within the State.

Another attractive possibility is that of producing superphosphate for export. Existing industries have a substantial home market, and with Christmas Island rock ranking as practically an indigenous raw material, are well placed for producing large quantities.

The ilmenite workings of Western Titanium at Capel near Bunbury were visited by the team. An agreement has recently been made with Laporte Industries for the establishment of a titanium oxide pigment industry near Bunbury at an estimated cost of £A4,000,000. Considerable quantities of ilmenite and some other associated minerals will still be exported.

Indeed, the cost of such easily won coal as that found at Collie (sub-bituminous, 9,000 B.T.U. per lb. with low ash content) is so low, compared with the costs of the previously discovered deep-mined seams, as to threaten the continued employment of the Collie miners — a problem which the Government is having to tackle by increasing its contracts for open-cast coal and reducing those for deep-mined coal only gradually.

In view of this problem the Government would clearly welcome further industrial activity at Collie using the local resources which, besides coal, include limestone and bauxite. Indeed, Government support and facilities would probably provide a better bargain for private industry to establish itself here than anywhere else in the State. Water supplies are more than adequate.

Attractions for Overseas Capital

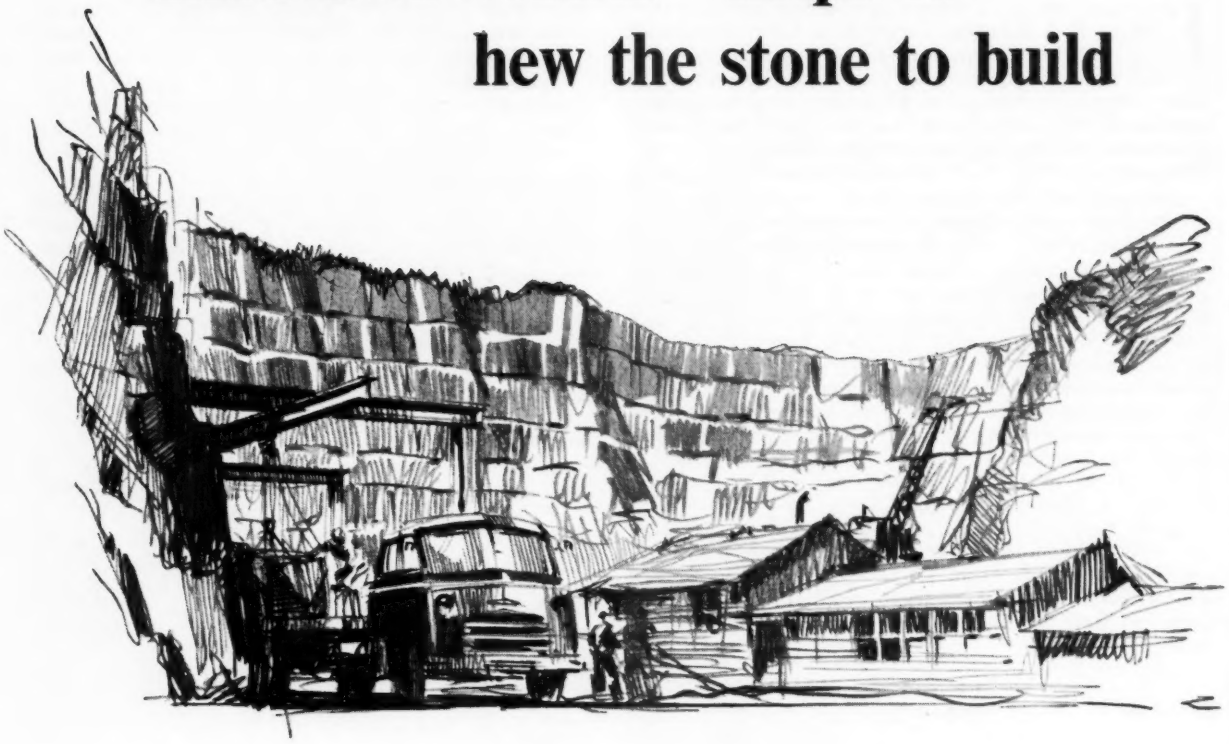
Because of its predominantly European population on the one hand and the acceptance of British traditions on the other, Australian legal codes, business practices and social customs differ little from those of the United Kingdom. These factors, states the report, together with the prevailing political and social stability, make Australia outstandingly attractive among developing countries to British investment. Indeed, of £945,000,000 of overseas capital invested in Australia between 1947 and 1959, over 60 per cent came from Britain. Western Australia in particular received almost all her outside investment from the United Kingdom. There can be no doubt that the size of the Western Australian market, with only 7½ per cent of the whole Australian population, has deterred British companies from establishing subsidiary enterprises in this State. However, many companies have found the local market and opportunities to export to the Eastern States and overseas sufficiently attractive to persuade them to establish an organisation in Western Australia.

In order to encourage the investment of capital from overseas, the Western Australian Government is prepared to give considerable assistance in appropriate cases to firms willing to establish enterprises in the State.

Since the authors of the report visited Western Australia, agreements have been finalised or are in the course of negotiation for a number of projects with a total value of £104,100,000. In addition, the production of alumina from bauxite mined in the Darling Ranges is to be undertaken by Alcoa (Australia), while a vanadium plant estimated to cost £5,000,000 is under investigation.

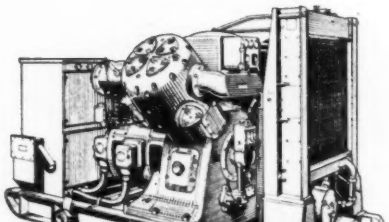
Industrialists requiring information should contact Sir Russell Dumas or Mr. John Darling at the office of The Western Australian Government, 115 Strand, London, W.C.2 (TEMple Bar 8601).

"BROOMWADE" helps to hew the stone to build



Vast building developments are creating an ever growing demand for stone, and the heavier pneumatic drilling equipment now employed in quarrying work necessitates an increased use of compressed air.

Quarrymen specify "BROOMWADE" Air Compressors, for they recognise their efficiency and reliability.



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First International Symposium on Agglomeration

THE First International Symposium on Agglomeration was held April 12-14, 1961, in Philadelphia, Pa. U.S.A. and was sponsored by the American Institute of Mining, Metallurgical and Petroleum Engineers. A total of 36 papers was presented, submitted from ten countries. The papers came from a wide variety of sources — universities, research organizations and industries involved in ferrous and non-ferrous extractive metallurgy, coal, cement manufacture and metal and ceramic fabrication. About two-thirds of the symposium was devoted to the agglomeration of iron ores. The agglomeration processes which were covered included sintering, balling, pelletizing, briquetting and powder sintering of metals and ceramic oxides.

The symposium left three prominent overall impressions: (1) that the field of agglomeration is no longer looked upon as just an unfortunate necessity brought about by increasing utilization of concentrates from lean ore deposits, but as a field of real technical and economic benefit to the subsequent iron making process; (2) that many of the recent advances in agglomeration processes are coming from the U.S.A.; (3) that the last decade has seen the emergence of pelletizing from a laboratory curiosity to a major industry. This third impression applies particularly to the U.S.A. as shown by the following table, which stresses the rapidly growing ratio of pellet/sinter production in that country since 1950.

Annual Capacity for the Production of Pellets and Sinter in the U.S.A.

	1930	1940	1950	1960	1970
Pellet production (000,000's s. tons)	0	0	1	15	40*
Sinter production (000,000's s. tons)	5	10	25	66	75*

* *predicted*

The tenor of the symposium clearly indicated that pellet production is expected to gain on sinter production in those countries where large reserves of low grade ores can be converted into high grade fine-sized concentrates exhibiting only slight fluctuations in their chemical and physical properties and where each iron making plant can be operated on just one or two of these ore supplies for many years to come. Only with a raw material situation of this nature can large pelletizing plants be operated more efficiently than sinter plants. This last statement is based upon the combination of the two following facts: (1) When agglomerating very fine particles (e.g., those produced by magnetic concentration or flotation) pelletizing is more efficient than sintering. (2) The pelletizing process is much more sensitive to physical and chemical fluctuations in the feed than the sintering process and therefore requires a feed of constant properties for smooth operation.

The incentive for American advances in agglomeration, particularly pelletizing, was emphasised in a number of papers — viz., that the required raw material situation is there. The most promising domestic source in the U.S.A. is taconite, an immense reserve of iron-bearing siliceous rock containing 20-27 per cent iron. In the Mesabi Range alone over 20×10^9 tons of 63 per cent iron concentrate can be obtained which, at present iron ore production rates, represent a 200 year supply.

On the other hand it is doubtful whether pellets will replace sinter to the same extent in a country such as the U.K. where the iron and steel industry depends upon a large number of different ores. The chemical and physical characteristics in such a raw material situation fluctuate considerably over short periods of time and hence the ores are more adaptable to the flexible sintering process than to the pelletizing process.

Sintering

The beneficial effects of self-fluxing sinter upon the blast furnace operation — viz., lower coke rates, greater outputs and smoother operation — have stimulated much research in flux additions to the raw sinter mix. Additions of limestone and dolomite up to 15 per cent of the raw mix have been made to ores ranging from one to eight per cent silica and the resulting sinter has been evaluated in terms of strength, reducibility and rate of output. Extensive microscopic and X-ray examinations of these sinters have been made with a view to correlating the strength and reducibilities obtained with the chemical changes taking place among the gangue constituents and iron oxides. Sinters ranging in basicity (i.e., $\frac{CaO + MgO}{SiO_2 + Al_2O_3}$ from 0·1 to 2.0 have shown a maximum strength and reducibility at an optimum basicity. However, investigators differed widely in the value of this optimum and it was apparent from the papers presented that many other important variables besides basicity, which depend on the raw materials used, were involved.

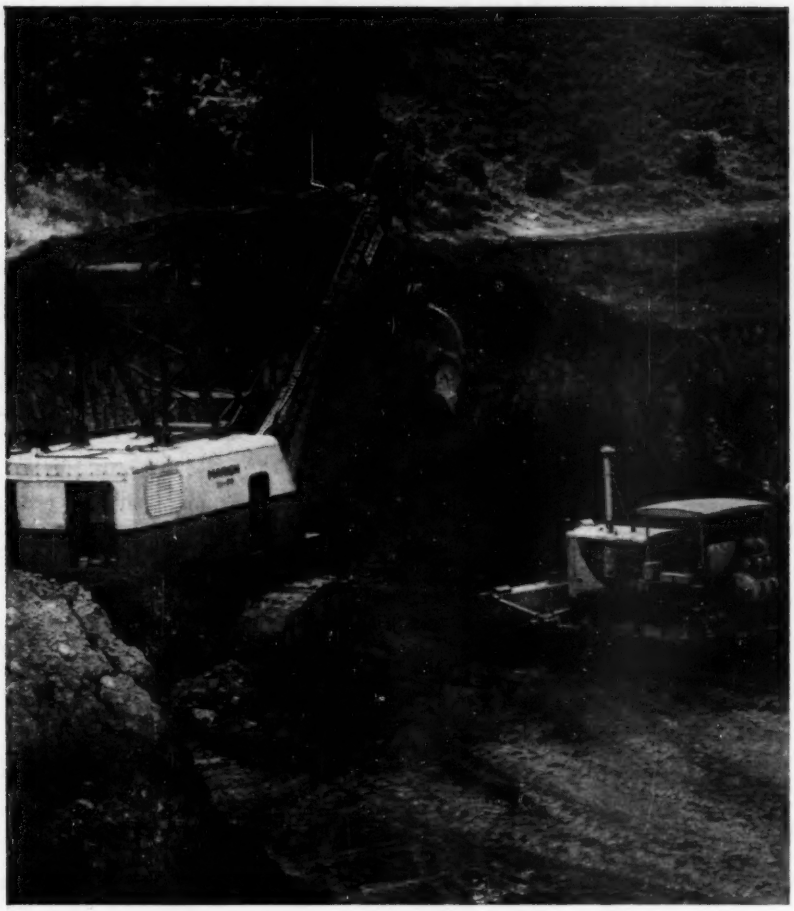
The engineering aspects of sinter plant design and operation received considerable attention. Auxiliary equipment such as pug mills or mixers have been enlarged or replaced with large drums and disc mixers. The swinging spout has been found inadequate for the wider strands of today (8 ft. or more) and has been replaced mainly by the roll-type feeder. Sinter cooling is an operation which still presents a formidable engineering problem. The space and equipment required for adequate cooling represents a considerable expense in the overall sintering operation. Hot crushing of the sinter to a suitable size for efficient cooling was indicated as the most feasible solution, but such a practice is rarely carried out.

A trend towards increased automation in sinter plant operation was evident — e.g., constant weight feeders and automatic control systems for such factors as bed height and operating speeds of strand, feeder and cooler. Automatic moisture control of the raw mix on a continuous basis is in the trial stage. Television has been used to relay pictures to the operating control panel showing the condition of the sinter cake as it leaves the strand.

Fuel was found to be a growing problem as the availability of coke breeze diminished. The symposium reported recent research on the use of gaseous fuels to preheat the air drawn through the bed; this process has brought considerable savings in solid fuel.

Pelletizing

Specular hematites were a popular theme throughout the pelletizing papers. It has long been known that the problems encountered in pelletizing specular hematite concentrates have proved considerably more formidable than those with magnetite. With the expanding demand by steel producers for an agglomerated product, it was felt that this had retarded to some extent the rate of expansion of specular hematite mining. However, the increasing prominence of specular hematites in world iron



MARION REPORTS FROM JAMAICA

Fleet of Marions provides high output...16-hour a day digging dependability in Bauxite operation

At the big Reynolds Jamaica Mines in St. Ann District, a familiar sight is this Marion 111-M, 4-yard shovel, digging and loading bauxite ore into dump trucks for transfer to the drying plant at Lyoford.

Working 16 hours a day, over 2,500,000 tons of bauxite are taken from the open pit mines yearly. Helping maintain this high production are six Marion shovels of 4- and 2½-yard capacities. Their average daily rate of loading is 10,000 tons.

Like many other Marion owners, officials at Reynolds like the ruggedness, size, speed and over-all performance characteristics of Marion machines.

Perhaps you have a job that requires the use of rugged, strong, low-maintenance and long-life Marions. Whatever the high demands, see your Marion Distributor for lowest cost performance and operation on your property.

You get MORE *with* MARION

MARION POWER SHOVEL COMPANY MARION, OHIO, U. S. A.

A DIVISION OF UNIVERSAL MARION CORPORATION

ore reserves has stressed the basic necessity of developing an agglomerated product that would equal magnetite pellets in physical and chemical quality. Consequently, in recent experimental studies of green pellet formation and firing considerable attention has been given to specular hematite concentrates. The effects of particle size, firing temperature and pellet size upon pellet quality have been investigated and the particle size has been found to be the major contributing factor towards an improved specular hematite pellet.

Interesting pilot plant tests were reported on the medium grade ore from the Wabush Lake deposit. Thirty per cent of the recoverable iron units are magnetite, the balance being mostly specular hematite. It was found that by separating and regrinding the magnetite portion and then mixing it back with the balance of the concentrate (largely specular hematite), sufficient specific surface was obtained to give good balling characteristics for the production of satisfactory pellets. The finely dispersed magnetite gave improved pellet strength since the magnetite-hematite bond was initiated at a much lower temperature than the hematite-hematite bond.

Work on various additives to fine concentrates prior to pelletizing indicated that small amounts of bentonite or slaked lime lowered the required firing temperature and shortened the required firing cycles due to an increase in the resistance to cracking on rapid drying. Very little investigation was reported on fluxed pellets. It was apparent that limestone additives demanded closer control of the firing process.

Various types of revolving machinery were discussed for rolling and compressing fine material into small balls for sintering or into pellets for hardening. Variables such as machine speed, retention time and feed preparation were singled out as the most important factors for obtaining the best operation with a given unit.

A newly designed unit — the multiple-cone drum pelletizer — was described. Compared to an ordinary cylindrical drum of the same size, the multiple-cone drum was claimed to produce a better rolling action, a longer retention time and better compression action while running at a peripheral speed of only half that of the ordinary drum. Test data showed that sintering rates were higher for material which had been treated in the multiple-cone drum than they were after treatment in other balling apparatus tried, viz., pug mill, disc and ordinary cylindrical drum.

Extensive testwork with disc pelletizers was also reported. For each ore there was a critical moisture necessary for optimum pelletization dependent upon particle size, size distribution, porosity and nature of the ore. Retention time of the material in the disc was found to be the most useful criterion in the study of pellet formation. The kinetics of pelletization indicated that a disc produced a size distribution of products which was a function of the material characteristics and the retention time.

Only one paper was presented on the briquetting of iron bearing materials. However, the process described showed several potential advantages over other methods of agglomeration. The process included hot briquetting of iron ore fines and concentrates and various furnace dusts. The iron ores included "earthy" and specular hematites and natural magnetites. Pretreatment of the raw material involved heating and partial reduction; no grinding or binder additions were necessary. The strength of the bonds between iron oxide particles increased as the amount of reduction, briquetting pressure and briquetting temperature increased. Pressures and temperatures of about 26 tons/sq. in. and 800°C were normally used.

Bauxite Prospecting in Hungary

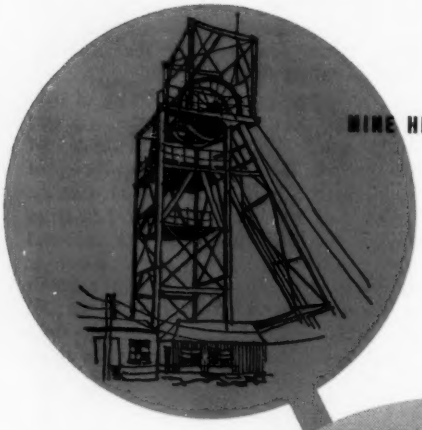
IN connection with a plan now announced to raise Hungarian bauxite output to 1,200,000 tonnes in the current year, it is stated that the country's bauxite exploration teams have been given the task of locating annually new reserves of from 1,000,000 to 1,300,000 tonnes of grade one bauxite and determining at least 1,500,000 tonnes of grade one material in reserves "not yet sufficiently explored". Further, between 700,000 and 1,000,000 tonnes annually is given as the target for the discovery of bauxite suitable for pyrogenous processing. Exploration in recent years, in northern and central Transdanubia and in parts of the Gömör chalk formation and the Bükh Hills over a total area of 4,300 sq. kilometres, has resulted in valuable additions to Hungary's known bauxite reserves, it is stated.

According to a report of the Eastern European economic co-operation body Comecon, some 33 per cent of all known Hungarian bauxite is of grade one and suitable for processing with the Baer method. A further 10 per cent of reserves are of grade two and the remaining 57 per cent of grades three and four, suitable for pyrogenous processing.

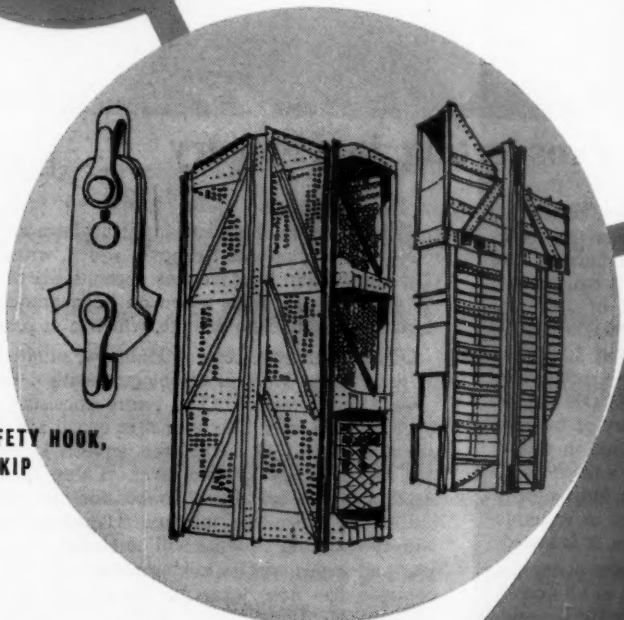
Hungary's known bauxite reserves are situated in the Bakony, Vértes and Gerecse areas and in the Pilis Hills, with less important deposits in North Hungary near Nésza, Gömör and Pécs, in the Harkány region and on the Hungarian-Yugoslav border. At present 55 per cent of production is from the Veszprém group of mines and 45 per cent from the Fejér group. Main single production sites are at Halimba, Nyirad, Iszka-Szentgyörgy and Gánt. In Eplény, Nésza, Nagyharsány, Hagyháza and Obarok are mines with unimportant deposits which, with the exception of the Nésza and Nagyharsány deposits, are of poor quality. At Alsopere is a mine based on large amounts of mainly third and fourth class bauxite, which is at present closed.

Of the four main centres, Halimba, situated to the south of the Bakony Hills, is the biggest, with a 1960 output of some 650,000 tonnes. The centre consists of five mines. Ore veins are from 2 to 30 metres broad and have an average diameter of 12 metres, the deposits being from 200 to 220 metres below ground level. Latest-known shift production figures are 6 to 7 tonnes for underground and 26 tonnes for open-cast mining. Halimba began last year with the building of what will be Hungary's biggest loading unit and with that of a mixing apparatus. One mine in the complex has now taken up production with the aid of vertical ore transportation shafts to ground level. What is stated to be the best bauxite in the country comes from the Nyirad mines, located near Halimba, which last year had an output of some 320,000 tonnes. Bauxite deposits there are lenticular masses of from 50,000 to 500,000 tonnes, bedded in Eocene clay and decked with limestone. Latest per-shift output figures obtainable are of 7 tonnes for underground and 84 tonnes for open-cast workings. Iszka-Szentgyörgy, in the northern Bakony Hills, consists of wide stretches of bauxite in deposit width of only 2 to 15 metres. The Gánt complex, in the eastern Vértes Hills, is made up of two open-cast mines.

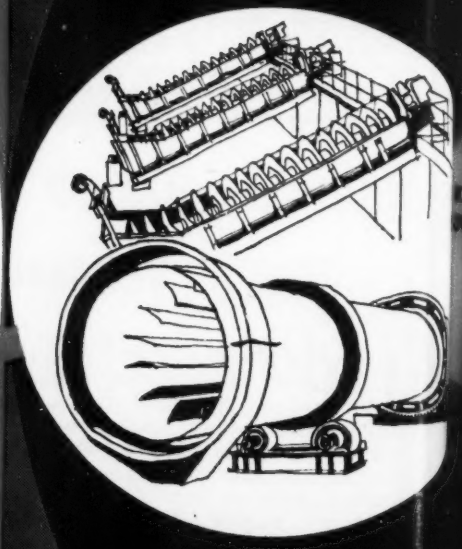
Winning and Processing Ores with HEAI



MINE HEADFRAME



HUMBLE SAFETY HOOK, CAGE and SKIP



Machinery and Equipment

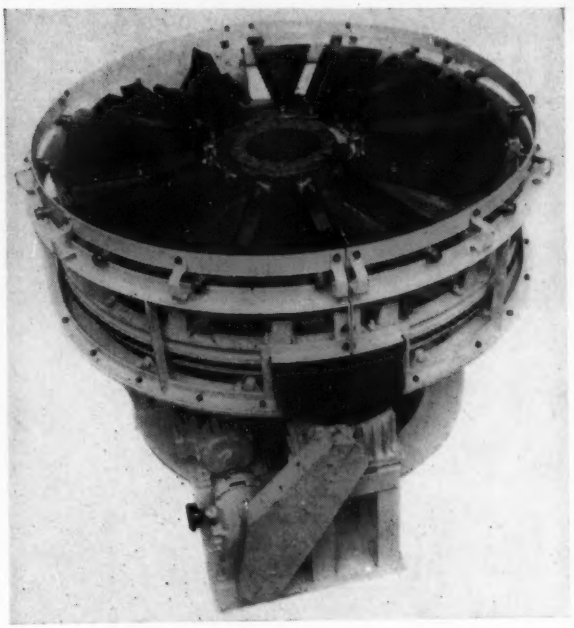
Loco for Swedish Iron Ore

The transport capacity of the northern part of the Swedish ore line started to become inadequate as early as 50 years ago. Electrification approximately doubled its capacity, and this was achieved without having to adopt double tracks. Since then, its capacity has increased at the same pace as larger locomotives have been put into service, and the heaviest trains hitherto (3,200 tons) are hauled by double-articulated Dm locomotives with a maximum tractive effort of 53 tons.

By inserting yet another section between the two sections of the double-articulated locomotive, the tractive effort has been increased by 50 per cent (the maximum effort being about 80 tons). As previously, this means a corresponding increase in the capacity of the entire line. However, the strength of the couplings has already reached its limit. Further, the capacity of the wagons is no longer thought to be adequate and they must be adapted to the more powerful locomotives before these latter can be fully utilized. Thus, when these new wagons are all in service, the traffic capacity of the ore line will again be increased by about 50 per cent and the double-track alternative can once more be left to the future.

The three locomotives in the series which have now been delivered consist of three permanently coupled parts which are similar except that the central section has no driver's cabins, no pantograph and no pony axle. The locomotive has, in all, two pantographs, three main circuit-breakers, three main transformers and three contactor equipments for voltage regulation. Since each third has two traction motors and four driven axles, the locomotive has, in all, six motors and 12 driven axles. The axle load is about 19 tons and the total adhesion weight about 230 tons; the weight of the locomotive is about 260 tons. The overall length of the locomotive is 35.25 m., the maximum tractive effort (4,500 A/motor) is 79.5 tons and the maximum speed 75 km/h (47 m.p.h.).

This locomotive, as is the case with all electric locomotives on the Swedish State Railways, has been supplied by Asea which, in the normal way, has made use of the services of AB Svenska Järnvägsverkstäderna, AB Motala Verkstad and Nydqvist & Holm AB for the mechanical parts.



The 10 sq. ft. horizontal table filter by Davey, Paxman & Co. Ltd. has been developed to provide efficient dewatering of quick settling slurries with facilities for multi-stage cake washing. It is suitable for handling slurries containing particles of widely dissimilar sizes. The Paxman table filter is built in a wide variety of materials, and in sizes providing up to 100 sq. ft. effective filtering area

EXTENDED RANGE OF VALVES

The range of Linatex pinch type valves manufactured by Wilkinson Rubber Linatex Ltd. has now been expanded to embrace motorized and pneumatically operated types. After considerable experience with the standard handwheel operated valve in sizes from ¼ in. bore to 8 in. bore these have now also been extended to include 10 in., 12 in. and 14 in. bores. As is well known the pinch type valve has the merit of giving full bore unrestricted flow when open. This makes it ideal for handling slurries and powders. The valve is glandless and the basic design greatly facilitates maintenance since it is necessary only to change the rubber sleeve to restore the valve in as new condition. It will not escape notice that the quality and performance of the valve sleeve require to be of high standard.

In most cases, especially when handling abrasive slurries or powders, the sleeve is made from Linatex rubber as incorporated in Linatex pumps, pipe lines and other material handling equipment. For handling chemicals the valve is fitted with sleeves made from an appropriate synthetic rubber material and these include butyl, nitrile, hypalon and neoprene as dictated by the working conditions. To augment the range of valves referred to above, the company also decided to market a range of non-return valves and safety/relief valves.

AEI M25 floodlights have been mounted on 60 ft. Tubewright towers to provide adequate illumination for round-the-clock handling of bulk fuel in the marshalling yards at the new Kincardine generating station of the South Scotland Electricity Board

NEW SEISMIC TECHNIQUES

One of the major problems in the rock and earth moving industry is the analysis of materials under the ground surface.

Ever since the development of heavy-duty tractor-mounted rippers several years ago, contractors have been looking for ways and means to extend their use on construction jobs. It has been shown that increased use of rippers will reduce earth and rock-moving costs, making possible larger profits for the contractor and at the same time lowering job costs.

In order to predict where rippers can be used economically, a vast amount of experience in many different materials is required. One sure method of determining whether or not a certain material is rippable is an actual field demonstration. This, however, is both costly and time consuming.

A relatively new development in seismic instruments, a portable refraction seismograph, now can be used to answer many of the soils engineers' problems. It has been described in *Northern Miner*.

The refraction seismograph measures, in terms of seismic velocity the over-all consolidation of sub-surface materials. This measurement of consolidation takes into account such factors as density, hardness, stratification, lamination, fracturing, jointing, and degree of weathering or decomposition. These

are the same factors, incidentally, which affect rippability of materials.

The principles of refraction seismology have been used for many years in the oil industry and in making geological surveys. Now this equipment is available in an inexpensive, portable package with an operating procedure so simple that it completely eliminates the trained specialist.

The refraction seismograph works on the principle that sound, or seismic, waves travel through subsurface materials at different speeds and along different paths. Speed of a seismic wave depends upon the overall consolidation of the material—the higher the consolidation, the higher the velocity.

The seismic wave is produced by a sledge hammer striking a steel plate at various distances from a geophone receiver. The receiver is sensitive only to the first seismic wave that reaches it. Thus, either the seismic wave that travels the shortest path or one that travels over a longer path, but which includes a high velocity segment, triggers the geophone. The time interval between the hammer blow and receipt of the seismic wave at the geophone can be read directly on the instrument panel.

Spacing of the hammer points, or seismic wave sources, at 10 ft. intervals permits the construction of a graph of time vs. distance. Slopes of the various segments of the curve represent the velocities of the seismic wave through each layer. Depth to the various layers can be calculated using velocities in a set formula.

Accuracy of depth determinations depends upon complexity of the area geology and depth of the profile. Depths calculated from seismic profiles often have varied within 1 ft., plus or minus, of core drill or well logs. Generally, maximum inaccuracies of 5-10 per cent may be expected at depths up to 50 ft. with inaccuracies up to 15 per cent possible at greater depths and under adverse conditions.

LORRY MOUNTED AIR COMPRESSOR

The Lead Wool Co. Ltd. announce the Truckair compressor, motivated by the Ford 592E diesel engine of the four cylinder, overhead valve type, driving the compressor through a centrifugal clutch. The compressor unit is the company's type AC3F, which has a piston displacement of 147 cu. f.p.m. and delivers approximately 120 cu. ft. of free air per min. at 1,350 r.p.m. The unit is fitted with an independent air receiver having a capacity of 6.2 cu. ft. and a fuel tank holding 12.5 gal.

The whole is mounted on a specially modified Ford chassis, powered by a Ford petrol engine and is adapted to take the ACDF.120 compressor.

★

The British Steel Piling Co., Ltd. has published a brochure on B.S.P. helical-weld pipes which has been revised to incorporate information relating to the manufacture of these pipes in aluminium. The new brochure now gives full details of the variety of thicknesses and diameters available for both steel and aluminium pipes.

Equipment Digest

The PSL2 lighting controller by Elcontrol Ltd. is a small self-contained photoelectric amplifier which controls the switching on and off of electric lighting according to the decline and increase of natural daylight. When the amount of daylight falling on the built-in photocell decreases to the switch-on level, the relay in the unit is de-energized, and the lighting circuit is switched on. When the daylight level rises to 1 ft. candle more than the switch-on point, the relay is energized, and the lighting circuit is switched off. If, however, the artificial light itself affects the photocell, and would be likely to cause continuous switching on and off ("hunting") the differential of 1 ft. candle is increased by means of the differential control until stable performance is reached.

The PSL2 responds not only to changes in daylight at sunrise and sunset, but also to fog and other weather conditions. It is useful for automatic lighting control for works yards, large-scale indoor lighting control—e.g. assembly shops, works stores, drawing offices and shop and store lighting.

★

A new hydraulic system for all blades used on the Euclid Model C-6 tractor has now been announced by Euclid Div., General Motors, and Gar Wood Industries, both of the U.S. Designed to meet speed requirements of the Torqmatic Drive C-6, this hydraulic package consists of a single cylinder and a variable-volume piston pump known as the Gar Wood Variacs.

The Variacs pump provides a number of advantages important in crawler-tractor application. It delivers oil only when needed for raising and lowering the blade . . . no oil circulates in the hold position. When the blade load exceeds system capacity, the pump stops delivery of oil and automatically goes into hold position.

The single-cylinder design features faster blade speed and lifting power up to 7 tons greater than other dual-cylinder dozer mountings. Better tractor balance and improved operator visibility are also featured. Easily-operated controls are completely power-actuated.

★

The indicating pneumatic temperature controller by Cambridge Instrument Co. Ltd. is an instrument for controlling the working temperatures of vats, autoclaves, or other similar containers; and the temperatures of refrigerating, air-conditioning, or other similar plant and processes, between −20 deg. C. and +340 deg. C. (−10 deg. F. and +650 deg. F.). When the temperature of the container or process rises (or falls) beyond a pre-determined level, the controller automatically cuts off the piped supplies of heating streams (hot air, steam, etc.) or cooling streams (brine, ammonia, etc.) until the temperature returns to the original level. The controlled temperature can either be that of the process or container itself or, more unusually, that of the piped supplies. The instrument can be used in almost any industrial process where this kind of temperature control is needed and where the supply of heating or cooling medium can be regulated by a diaphragm valve.

Turner Brothers Asbestos Co. Ltd. have recently issued two new publications covering the products they supply for moulding and reinforcing plastics.

Durestos Resinated Asbestos Moulding Materials Booklet (SA.6) describes Durestos, a moulding material manufactured from intimate blends of asbestos and thermosetting resins and is available in three forms—felt, flock and powder. The booklet describes the use of this material for high-pressure, low-pressure and no-pressure moulding techniques, together with details on machining moulded components. A host of technical data is included covering strengths, chemical resistance, thermal conductivity, density, etc.

Duraglas Glass Fibre Reinforcements Booklet (D.6), describes the properties of Duraglas, giving details of woven fabrics, tapes, chemically and mechanically bound mat, woven roving, roving, chopped roving, flock and webbing.

★

A new elapsed time meter for recording the time a piece of equipment has been in use is being produced by English Electric. It can be applied to any equipment used intermittently and on which planned maintenance or a time log is required e.g. pumps, ventilating and heating systems, valuable vacuum valves (X-ray transmitting tubes, etc.). The meter is normally connected so that it is automatically switched on and off with the apparatus being metered. It can register up to 9999.9 hours in steps of 0.1 hour.

The cyclometer register is driven by a self-starting, non-reversing, synchronous motor, through a train of gears. Operation is on A.C. supply in the voltage ranges 100-125, 200-250, and 400-440. The frequency can be 50 or 60 cycles. The meter is available in two case types.

★

Rapid Magnetic Ltd., introduce means of avoiding premature release (due to supply failure) of tramp iron extracted by electro suspension magnets. Auxiliary built-in permanent magnets retain the collected iron until the holding force is neutralized by operating the contactor controller and reversing the current. The technique can be applied to any of the wide range of circular, square or rectangular suspension magnets produced by Rapid.

★

Industrial Timer Corporation, U.S. has announced the development of a versatile recycling timer called the Series Dual-Trol, believed to be the smallest recycling timer available with interchangeable timing elements. The timer is suited for control of machine tools, material handling and chemical processes or virtually any operation where on and off intervals must be frequently changed.

The Series Dual-Trol recycling timer produces a series of on and off electrical pulses, which can be used to start and stop a process in a predetermined sequence. The time interval of both the on and off signals is easily changed by adjusting the timing knobs on the face of the two timing modules. One module controls the duration of the on cycle; the other controls the duration of the off cycle.

MINING MISCELLANY

Barclays Bank D.C.O. reports that phosphate exports from Israel to Japan, which had to be discontinued because of prohibitive shipping costs after only 30,000 tonnes of a 100,000 ton order had been shipped earlier this year, are expected to be resumed shortly, since return cargoes from the Far East are now practically assured.

★

Tenders are sought, by August 5, for the complete installation at Aswan, U.A.R., of plant for the concentration or beneficiation of iron ores. This is a renewal of a tender first applied for in January last. Details are obtainable from the Egyptian Iron and Steel Co.

★

Test holes have been drilled by Standard Chemical Ltd., of Quebec, preliminary to undertaking a solution mining project, to cost $1,000,000 in its exploratory phase, for the recovery of potash from deposits in north-west of the Belle Plaine area of Saskatchewan. If tests prove successful, a multi-million dollar plant is planned.

★

An iron ore reduction plant, using the Krupp-Renn reduction process, may be built in Costa Rica, at a cost of $100,000,000. It would be financed by firms in Europe, the U.S. and Costa Rica. The plant would use ore averaging 50 per cent and an annual output of 3,000,000 tonnes of iron "luppen" (a product between pig iron and sponge iron) is estimated. The Costa Rican State Department has approved the plan, which would include the construction of an electric power plant consuming Venezuelan crude oil.

★

Operations at the Nimba mine in Liberia, which is owned by the Lamco Joint Venture, are scheduled to start in 1963. Between December 1953 and the end of 1960, a total of $33,350,000 has been spent on the project. The assets are valued at $39,520,000 in the balance sheet of Lamco. The Swedish Grängesberg Co. is handling the procurement and construction work. Work on the railway from Lower Buchanan to Nimba, over 250 kilometres, has started and a road-building programme covering more than 160 kilometres has been completed.

★

Greek mining plans, announced recently by Mr. N. Martis, Minister of Industry, include the exploitation of mineral deposits in Western Thrace, Eastern Macedonia and Epirus. The Greek Industrial Development Organization (OBA) is undertaking the working of the State tin-mine at Krirki, while the Hunting Corporation of Canada is also prospecting in Greece for metal deposits. Exploitation and investigation of the manganese ore deposit at Drama will also be undertaken.

★

Pennarroya has announced the discovery of an extensive deposit of silver-bearing lead near Largentiere, about 70 miles north of Nimes. Investigations are continuing and Pennarroya is applying for concessions over a larger area than the 500 acres originally granted.

One of the world's largest private teletype networks was opened recently by Aluminium Ltd., to link 81 stations in Canada, the U.S. and Britain. All intercontinental messages are routed through switching centres in Montreal and London. Stations on the 12,000-mile network are located in aluminium plants and administrative and sales offices.

★

Grängesberg Co. have begun work on their integrated steelworks at Oxelösund, which is designed to produce 300,000 tonnes of high-grade heavy plate annually. Grängesberg have spent about £41,000,000 on this project, which amounted to over three-quarters of the sum which the company obtained when the Swedish government acquired its shares in the LKAB Lapland iron-ore mining company in the mid-1950s. When in full operation, the Oxelösund plant, including the new and old works, will consume 800,000 tonnes of ore mainly from the company's own mines at Grängesberg and Strassa; 450,000 tonnes of coal, 190,000 tonnes of lime and dolomite and 60,000 tonnes of oils. Most of these supplies will be handled by the company's own rail and shipping transport facilities.

★

Japan is to buy 6,000,000 tons of iron ore from India by the end of the Third Plan period. Japan has agreed to make available a credit of Rs.10 crores to the government of India.

★

Simon-Carves Ltd. have received a contract to design and erect a dense medium coal preparation plant at Bentley Colliery in the North Eastern Division, N.C.B. The plant will provide additional large coal cleaning facilities at Bentley. It will be capable of washing 250 tons per hour, the remainder will go either to the existing preparation plant or will be outloaded as a dry product. Primary and secondary Drewboy dense medium separators, working in series, will comprise the new plant, together with all ancillary equipment. Site work is expected to start in approximately six months and it is estimated that the plant will be commisioned 18 months later.

★

The Indian Mineral Development Corporation has been allotted two projects which should effect national economies up to about Rs. 250,000,000 when they are completed. One is the Bailadila Iron Ore project, in Bastar, Madhya Pradesh, which will become the biggest iron producing area in the country, where the ferrous content of the ore is well over 70 per cent. Work is to start there immediately at a cost of Rs.15 crores, and is scheduled for completion by January 1966. Capacity is expected to be 4,000,000 tons annually (with possible 50 per cent expansion) and the entire output will be exported, mainly to Japan. The other project, Khetri Daribo copper mining, cannot be started until the Corporation has recruited more trained personnel. However, completion there should be by October 1963. The plant will involve an outlay of Rs.13 crores, and will produce 12,000 tons of electrolytic copper annually for home consumption, effecting a saving in foreign exchange of Rs.4.2 crores annually.

Two modern coal mines, with a total annual capacity of 1,650,000 tons, and a big coal-dressing plant with an annual capacity of 600,000 tons are under construction at the Tungchwan colliery, in the province of Shensi, north-west China and should be in operation by end 1961. This colliery formerly had an annual output of about 100,000 tonnes. It now has 12 shaft, slope and drift mines. New pits are also being constructed at the Kailan coalfield and in other areas, and existing pits are being modernized and extended.

★

Nominal production capacity of the Eurochemic plant at Mol, Belgium, has been given by the O.E.E.C. as 350 kg. daily of natural uranium and from 20 to 250 kg. daily of enriched uranium. Alloys of uranium and molybdenum, and of uranium and aluminium, and uranium oxide will also be produced. The plant is a joint European project, and the building will be undertaken by Saint-Bain Nucleare, of France, Nohab of Sweden, Belchim of Belgium, Montecatini of Italy, Argtu of West Germany, Comprimo of Holland and Noratim of Norway. Research laboratories are to be built by Swiss, Spanish and Danish firms.

★

A Western German delegation, including geological and industrial experts, has arrived at Tananarive, in Madagascar, to start a study of the island's development possibilities.

★

The Sredna Gora copper combine in central Bulgaria is expected to have an initial capacity of 4,000,000 tonnes annually when it starts up in 1963, and ore production is scheduled to be doubled as from 1966, reports the East German news agency, *ADN*. The copper ore deposit of 200,000,000 tonnes, is situated in the Ortes Medet area and will be mined mainly by opencast methods. Output of the combine is given as 140,000 tonnes annually of pyrite concentrates and molybdenum concentrates and up to 22,000 tonnes of pure metal.

★

A team of Japanese nickel industrialists has arrived in Djakarta, Indonesia, to study the nickel deposits on Sulawesi, where reserves are estimated some 50,000,000 tonnes. The delegation, which will discuss possible Japanese interest in exploitation, is led by the president of Sumitomo.

★

Salzgitter of Western Germany is stated to have completed a study of possible development of the United Arab Republic's ferrous metals industry, which was drawn up at the request of the U.A.R. government.

★

A gemstone, called Ekanite after its discoverer, Mr F. L. D. Ekanayake, who found it in Ratnapura, Ceylon, twelve years ago, has now been declared to be a metamict mineral crystallizing the tetragonal system. The *British Scientific Journal* has given its formula and analysis.

★

Two big deposits of celestite are reported from Kalu Kuhar in the Dadu district of Pakistan.

Metals and Minerals

U.K.A.E.A.'S Uranium Programme

Uranium supply and demand became even more out of balance during the year under review, states the U.K. Atomic Energy Authority in its annual report for the 12 months ending March 31, 1961. Schemes to restrict current output have been put into operation in most producing countries, but the report points out that these only reflect a deferment of deliveries under existing contracts.

The Authority's commitments continue to be considerably in excess of its current requirements, it stated, and the burden was further increased by the rephasing of the nuclear power programme announced in June, 1960. The effect of this on the Authority's prospective stocks was offset by the stretch-out agreements reached, after a year of negotiation, between the South African Atomic Energy Board, the U.S. Atomic Energy Commission and the Authority in January 1961. Under these agreements the total quantities of material to be bought separately by the Authority and by the Commission remain unchanged. Deliveries to the Commission will be completed by the end of 1966, but those to the Authority up to that date will be reduced by 6,000 tons, this quantity being delivered between 1967 and 1970. These agreements will not only defer expenditure but will to some extent reduce it; since several relatively high cost mines will cease to produce and others will have smaller contracts, the industry is now able to sell at a price which will be rather lower than the average payable under the former C.D.A. contracts.

The uncertainty of outlook, even for established producers, called for a review of the guarantees given by the Authority to take up new production from the Federation of Rhodesia and Nyasaland and from a number of colonial and dependent territories. Recalling that these guarantees had been issued at a time when there was an urgent need to increase world production, the report points out that they had not led by 1960 to the proving of any major deposits, while the undertaking to offer "prices which were reasonable in the circumstances of the time" ceased to have any meaning when there were no longer buyers at any price for substantial quantities of uranium.

Final deliveries were also made during the year under the contract between the Agency and Union Minière for uranium from the Shinkolobwe mine in the Congo, which is now worked out. Thus ended a connection which goes back to April 1939, when the possibility of an atomic weapon was first being canvassed.

The only remaining C.D.A. contracts are those with Portugal and Australia, the last of which will have expired by early 1963. Arrangements were made, following the C.D.A.'s agreements in South Africa, for deliveries by the Harmony G.M. Co., under the separate contact with the Authority, to be extended to 1970.

Deliveries from Canada were less than three-quarters of those in the previous year as a result of the 1959 stretch-out agreement and further subsequent adjustments. Reference is made in the report to the exchange of letters with Eldorado in 1957, arranging for the supply of a further 12,000 s.tons during the period 1963-66. After the exchange, the Authority's requirements declined rapidly and soon reached the point where none of the 12,000 tons was needed. Eldorado therefore was asked in early 1958 to renegotiate the arrangement but no agreement was reached. Further discussions took place at intervals up to November, 1960.

According to reports emanating from Canada, the position at the present time is that the Authority is now expected to take the full 12,000 s.tons originally covered by the exchange of letters, but at a price of between $5 and $6 per lb, as against $8 in the 1957 agreement. The Canadian government has agreed to stretch out deliveries beyond the 1963-66 period by storing uranium oxide concentrates from private mines at an annual cost to the A.E.A. for carrying charges. Sir Roger Makins is understood to have accepted the 1957 letter of intent as a binding commitment on the U.K., and it is further understood that he is ready to return to Canada as soon as the officials whom he left there have completed a detailed study of production costs at the six remaining producing companies. Apparently the formula now under examination by U.K. and Canadian officials would distribute the U.K.'s 12,000 ton purchase around these six producers in proportion to their existing contracts. Finality has yet to be reached, but it appears to be generally expected that the agreement can be concluded, and that the price will not be much above $5 per lb.

RUTILE WEAKENS FURTHER

Despite the long and persistent downward slide in Australian rutile shipment prices, a further bout of weakness has recently hit the market. Whereas at the end of June price ideas were in the region of £23 for 95-97 per cent material, they are now around £19 10s. and offers as low as £19 5s. have been received. This compares with peak prices of over £100 a ton a few years ago. Sooner or later prices must obviously bottom, if they have not already done so, but the outlook can hardly be described as encouraging so far as the short term is concerned. Stocks in the U.S. are still heavy, while U.K. buyers are said to be covered for some time ahead. Australia alone is more than capable of satisfying the whole of the present world demand.

INDIAN MANGANESE EXPORTS

An incentive to Indian exporters of manganese ore was recently announced in New Delhi. Exporters will be permitted to import mining equipment and machinery for improvement of their manganese mines to the extent of 5 per cent of the foreign exchange earned by them through the export of manganese ore in cases of straight sales against cash. An additional import entitlement not exceeding 5 per cent (thus making a total of 10 per cent) will also be considered on merits in individual cases, where the actual users establish the need for it.

In the case of exports of manganese ore under barter, the import of machinery will be allowed to the extent indicated above, on condition that the value of the imports under the barter agreement is reduced to the extent of the machinery entitlements.

It remains to be seen how far these measures will help to increase sales of Indian ore, which have recently been declining because of competition from other suppliers.

*

Conditions in the manganese markets remain uninspiring. World consumption is expected to continue rising as steel industries advance their output targets. However, production is expanding not only in such major producing nations as India and Brazil, but also among new competitors.

In the U.S. improved steel mill operations helped towards a few modest fill-in orders of manganese ore during June, but consumers in general appeared to have adequate supplies.

In the U.K., too, the supply position generally is a very comfortable one. Apart from some demand from Japan, the overall volume of new buying interest is slow and looks like continuing that way with the onset of the seasonally slack summer period. In the circumstances, prospects appear bleak for any upward movement in prices, even on a modest scale.

U.K. imports of ore from all sources during May totalled 33,305 l.tons, bringing receipts in Jan.-May to 216,554 tons, according to Board of Trade statistics. Over the first five months of last year imports were 191,506 tons. It is understood that stocks of ore in the U.K., which have stood at a substantial level for some time, are, if anything, tending to increase.

INDIA'S REVISED ALUMINIUM TARGETS

India's targets for aluminium and pig-iron as set out in the draft outline of The Third Five-Year Plan are being raised by the Planning Commission. The need for stepping up the aluminium target has arisen because of a proposal to manufacture electrical cables. The revised target may be fixed at 120,000 tons. The present target of 88,000 tons will be achieved through five schemes, two of which relate to expansion of existing plants, and the remaining three relate to establishment of fresh capacity. Besides this, steps are afoot to set up a 30,000 ton plant at Karwar in Mysore State with the collaboration of Reynolds Metals, and also a smelter under the public sector with Hungarian aid.

An important factor in determining the quantum of expansion is the pace at which it is considered feasible from the technological angle to substitute aluminium for copper during the next five years. Another consideration is the possibility of exporting aluminium.

In the case of pig iron too, the draft Plan target of 1,500,000 tons is likely to be raised, although the steel ingot target remains unchanged at 10,200,000 tons.

*

Sweden's only producer of primary aluminium, AB Svenska Aluminium Co., has been taken over by AB Svenska Metallverken, of Vasteras, a manufacturer of aluminium semi-products.

(continued overleaf)

Since 1949 the former company has been jointly owned by Metallverken and Aluminium Ltd. Its capacity is to be increased from 16,000 to 30,000 t.p.a. of primary aluminium over the next two or three years.

★

Cerro Corp. has signed a 20 year power contract for a proposed aluminium plant near Wauna, Oregon. The Bonneville Power Administration has agreed to sell 90,000 kW. of power to Cerro for a two-potline, 55,000 t.p.a. aluminium reduction and processing plant. This agreement replaces an earlier contract of the Bonneville Power Administration with United Pacific Aluminium Corp. for a similar plant elsewhere. United Pacific was merged into Cerro earlier this year. Cerro has an option on a site of approximately 1,000 acres near Wauna, on the Columbia River, close to the Pacific Ocean. This will permit water-hauling of bauxite to the plant, as well as dispatching by water.

★

October 1, 1962, is given by East German authorities as the starting date for test production at the new Lauta aluminium plant near Cottbus, described briefly in *Mining Journal Annual Review, 1961*. The first 32 pots are already under construction, while accommodation for a further 32 has been completed. By 1963 the plant will have an annual capacity of 11,500 t.p.a. which, according to earlier statements, will be raised to 20,000 t.p.a. in the following year.

FIRST QUARTER U.S. RESULTS

Domestic consumption of the **platinum group metals** in the first quarter of this year was 14 per cent higher than in the preceding quarter but 34 per cent below the level of the corresponding period of 1960, according to the U.S. Bureau of Mines.

Total sales in the quarter came out at nearly 180,000 oz. compared with 194,000 oz. in the first quarter of last year. Net imports of platinum group metals at 143,000 oz. were 28 per cent higher than in the preceding quarter but 44 per cent lower than in the corresponding period of last year. Palladium sales rose 21 per cent due to increased demand from electrical and chemical industries and, in fact, comprised 88 per cent of the totals sales of the group of metals. No platinum group metals were acquired for the government stockpile under the barter programme.

Increases were recorded in practically all phases of the U.S. **antimony** industry in the first quarter of this year. Although the domestic price held steady throughout the period the price of foreign metal rose from 1 to 1¼ c. per lb., according to grade, to a range of 28-29¼ c. which was attributed to a world shortage of mined ore rather than to any large increase in output of products.

Output of primary smelter production of antimony increased by nearly 600 tons compared with the corresponding quarter of 1960. Smelter output of antimony metal rose 200 tons above the level of the preceding quarter while antimony in by-product antimonial lead increased 300 tons, and 100 tons more oxide.

Antimony imports of 3,700 tons were the highest since the final quarter of 1957. Ores and concentrates, mostly from Mexico and South Africa accounted for 48 per cent of the total, and antimony metal, supplied principally from the U.K. and Yugoslavia, for 43 per cent. Antimony oxide from the U.K. accounted for most of the remainder.

Domestic output of **bauxite** fell sharply by 40 per cent compared with output in the first quarter of 1960. Imports for consumption, however, remained steady.

Domestic output of **selenium** and selenium compounds in the first quarter of this year was 208,974 lb. against 147,931 lb., which represented an increase of 24 per cent. Shipments totalled 169,243 lb. compared with 167,724 lb. shipped in the fourth quarter of 1960. Imports of selenium and selenium salts for consumption in the first quarter were 31,746 lb. against 53,824 lb. Canada supplied 30,600 lb. and Sweden 1,146 lb. The import return did not include 2,418 lb. of selenium contained in selenium-bearing concentrates imported from Rhodesia and Nyasaland.

Total stocks of **cadmium** in the U.S. increased by 335,000 lb. during the first quarter of 1961. Production of primary and secondary cadmium was about 14 per cent higher than in the preceding quarter. Shipments of cadmium metal by producers, including internal plant consumption, amounted to 2,636,600 lb. compared with 2,569,600 lb. in the fourth quarter.

Copper · Tin · Lead · Zinc

(From Our London Metal Exchange Correspondent)

Metal prices have shown little material change except that those for lead and zinc have trended lower. The holiday season is now beginning to be felt, causing markets to become somewhat thinner and therefore more likely to react violently to any individual piece of news, so that in the weeks to come fairly large daily fluctuations may occur.

COPPER FIRMER ON STRIKE FEARS

A firmer tone has developed in the copper market due to growing reports of labour troubles in various countries, combined with a relative tightness of the metal in the U.S. for this month. In Chile the El Salvador workers seem to be prepared to strike at the end of the month and reports indicate that the possibilities of a prior settlement are not good. In Canada a strike at the Noranda refinery now appears a possibility for early September. In the U.S. the contract between Kennecott and the Steel Workers Union expires at the end of the month and a settlement is still under negotiation. In Rhodesia, although there is no definite news, the rising political temperature may bring about some stoppages of work either in the Copperbelt or on the Coast railway.

In spite of this the Belgian price for copper was lowered at the end of last week to the equivalent of about 28.80 c. per lb. New York or Antwerp. In the U.K. stocks increased by a further 550 tons to a total of 19,877 tons and the contango remains unaltered between 80 and 85s. per ton.

TIN CONTINUES EASIER

In view of the unhelpful communique issued by the International Tin Council at the end of last week, the tin market has been relatively featureless with dealers and others trying to assess what is likely to happen when the Council resumes its discussions on August 22. Rumours have been circulating in the last few days that the release of about 4,000 tons of tin by the U.S. Administration is imminent, but when it comes it should have little effect on the market price.

In spite of a further reduction in stocks of 230 tons to a total of 6,790 tons, the contango has remained relatively much the same. Market observers take this as a sign of underlying weakness, but it seems hard to believe that there can be any major recession in price. The major aspects of the I.T.C. communique are dealt with in a separate article (page 29).

On Thursday the eastern price was equivalent to £932½ per ton c.i.f. Europe.

LEAD AND ZINC

Both lead and zinc prices have tended to slide, the former under the influence of a stock increase of 1,415 tons to a total of 12,883 tons, whilst offerings of zinc have been on a more liberal scale than recently, although stocks fell by 166 tons to a total of 6,726 tons. A momentary firmness to the zinc market was imparted by the news that there was a strike at the American Zinc Co.'s plant at Monsanto. This soon disappeared when it was realized that this smelter produced special high grade zinc, of which there was already an over-supply in the States.

The final report for the quotas in the U.S. for the second quarter of 1961 shows that only in the case of zinc ore from Canada and zinc from Belgium and Mexico were there short deliveries against the permitted tonnage.

★

The statistics issued by the British Bureau of Non-Ferrous Metal Statistics for the month of May (April figures in parentheses) were as follows (in l.tons):

Copper consumption	58,522	(53,976)
End month stocks ...	128,476	(126,949)
Tin consumption ...	1,807	(1,675)
End month stocks ...	11,330	(11,666)
Lead consumption ...	31,117	(30,805)
End month stocks ...	56,467	(66,311)
Zinc consumption ...	30,085	(27,271)
End month stocks ...	65,515	(66,680)

★

Official turnovers (in l.tons) for the week ending July 7, with the previous week's figures in parentheses are:—

Copper	21,075	(12,975)
Tin	1,775	(4,250)
Lead	9,850	(11,500)
Zinc	9,100	(7,675)

Closing prices are as follows:

	July 6		July 13	
	Buyers	*Sellers*	*Buyers*	*Sellers*
COPPER				
Cash	£230	£230½	£228	£228½
Three months ..	£234½	£234¼	£233	£233½
Settlement ..	£230½		£228½	
LEAD				
Current ½ month	£64½	£64½	£64½	£64½
Three months ..	£66	£66½	£65½	£65½
TIN				
Cash	£916	£917	£911	£912
Three months ..	£924	£925	£924	£925
Settlement ..	£917		£912	
ZINC				
Current ½ month	£78½	£78½	£77½	£77½
Three months ..	£79½	£79½	£78½	£78½

LONDON METAL AND ORE PRICES, JULY 13, 1961

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £230 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 0d. lb.
Cerium (99%) net, £15 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 12s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, 252s. 2d.
Iridium, £20/£23 oz. nom.
Lanthanum (98%/99%) 15s. per gram
Magnesium, 2s. 2½d./2s. 3d. lb.
Manganese Metal (96%/98%) £275/£285
Nickel, 99.5% (home trade) £660 per ton
Osmium, £17/£22 oz. nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £27½/£28
Quicksilver, £66 ex-warehouse
Rhodium, £43/£45 oz.
Ruthenium, £14/£16 oz. nom.
Selenium, 46s. 6d. per lb.
Silver, 79½d. f. oz. spot and 80d. f'd.
Tellurium, 37s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis		30s. 0d./35s. 0d per unit c.i.f.
Beryl (min. 10 per cent BeO)		270s./275s. per l. ton unit BeO
Bismuth		65% 8s. 6d. lb. c.i.f. 18/20% 1s. 3d. lb. c.i.f.
Chrome Ore—		
Rhodesian Metallurgical (semifriable 48%)	(Ratio 3 : 1)	£15 5s. 0d. per ton c.i.f.
,, Hard Lumpy 45%	(Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
,, Refractory 40%		£11 0s. 0d. per ton c.i.f.
,, Smalls 44%	(Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Baluchistan 48%	(Ratio 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides	(Ratio 10 : 1) Nb_2O_5 : Ta_2O_5	165s./167s. 6d. per l. ton unit c.i.f.
Lithium Ore—		
Petalite min. 3½% Li_2O		50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O		76s. 0d./80s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O		75s. 0d./85s. 0d. per ton f.o.b. Beira
Magnesite, ground calcined		£28 0s./£30 0s. d/d
Magnesite Raw (ground)		£21 0s./£23 0s. d/d
Manganese Ore Indian—		
Europe (46%-48%) basis 60s. 0d. freight		73d./75d. c i.f. nom.
Manganese Ore (43%-45%)		69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)		nom.
Molybdenite (85%) basis		10s. 0d. per lb. (f.o.b.)
Titanium Ore—		
Rutile Australian 95/97% TiO_2 (prompt delivery)		£19 5s./£19 10s. per ton c.i.f.
Ilmenite Malayan 50/52% TiO_2		£11 10s. per ton c.i.f.
Ilmenite Travancore 58/60% TiO_2		£5/£5 10s. per ton c.i.f.
Wolfram and Scheelite (65%)		128s. 6d./132s. 6d. per unit c.i.f.
Vanadium—		
Fused oxide 95% V_2O_5		7s. 6d./8s. per lb. V_2O_5 c.i.f.
Zircon Sand (Australian) 65-66% ZrO_2		£16 ton c.i.f

Mining Finance

London Tin Profits Top the £1,000,000 Mark

In February of this year, when London Tin's second interim dividend was declared, the directors estimated that the net profit for the year after taxation would be £980,000. This estimate has proved to be conservative, for the net profit has now been declared at £1,006,369 compared with £598,943 for the previous year. This increase, over 75 per cent of which has been passed to shareholders, is mainly due to the increase in dividends received during the year from the company's investments in operating tin mines. The net profit before taxation increased by £847,926 to £1,958,369 whilst taxation increased from £551,500 to £952,000. Dividends for the year amount to 35 per cent, as against 25 per cent for the previous year and absorbed £775,660.

The greatly improved fortunes of the operating tin mines is not only reflected in London Tin's profit figures but also in the value of its portfolio. On March 31, 1960 the market value of its portfolio was £14,746,544, at the same date this year it was £20,812,250. Based on the consolidated balance sheet the intrinsic value on March 31, 1961, was 24s. compared with the London market price at that date of 15s. The market price has since risen to 20s. at which price the shares stand to yield 6.8 per cent.

Almost eighty per cent of the company's investments are held in operating tin companies, and this holding is spread through Malaya, Nigeria and Thailand. The remainder of the portfolio is invested in equity holdings in commercial and industrial undertakings, other minerals including oil, public utilities and trust companies. In his statement to shareholders the chairman, Sir Douglas Waring, has said that this non-tin section has also shown an improvement over book value during the past year.

The geographical analysis of investments given in the directors' report shows that 10.5 per cent are held in the United Kingdom, 59.4 per cent in Malaya, 18.6 per cent in Nigeria whilst 5.0 per cent are international in character.

With reference to the prospects for the current year the chairman has said that it is too early to make any reliable estimate of the dividends to be received but it is his hope that it will be possible to maintain the existing dividend on the increased capital, following the proposed capitalization issue of one for five. Whilst it is understandable that Sir Douglas does not want to be over-optimistic, the picture does seem rather brighter than that. Even if there were no increase in the dividend revenue from the past year it would be possible to maintain the dividend on the expanded capital and all the indications are that the revenue will increase.

"I must be almost certain that over the full year the tin price will be higher than it was between March 1959 and March 1960 and added to this fact the output of the London Tin companies is increasing. During the first six months of this year the output of tin from the group is almost 20 per cent up when compared with the same period for the previous year,—11,104 against 9,250 tons. It is unlikely that this rate of expansion will be maintained but there will undoubtedly be an improvement over 1959/60.

An extract from Sir Douglas Waring's statement is published on page 56.

MOUNT ISA BREAKS PRODUCTION RECORDS

For the year ended June 30, 1961 Mount Isa has broken all previous production records. Not only has the total tonnage treated reached a record level but the production of copper, lead and zinc have all increased during the year.

The lead bullion produced was 53,300 tons (1959/60—50,520 tons) and zinc concentrates 59,339 tons (33,659 tons). The copper production was an all time record, blister copper produced being 47,620 tons, compared with 40,475 tons for 1959/60 and the copper concentrates shipped also increased to 94,775 tons (86,643 tons).

These increased production figures reflect the progress that is being made on Mount Isa's huge expansion programme. The 1959/60 financial year produced record profits of £5,358,000 with the value of metal sales at £22,800,000; this year the metal sales revenue should be even higher. Costs will also be higher as the wages award granted to employees by the court in November 1959 will be reflected throughout the full year's operations, but, the increase in revenue should offset these extra costs and last year's profit level should be at least maintained.

THE HARMONY-VIRGINIA DEAL

In the latest group of circulars from Harmony, Virginia and Merriespruit, the proposals for the transfer of mining rights are further discussed and very full details of the interests of the directors are given. The meeting to approve the deal is now to be held on July 24, following an initial postponement.

In the circular from Harmony, the technical advisers strongly recommend the proposal to sell the mining rights over two areas totalling 397 claims to Virginia. However, before discussing these proposals it is only right that the Harmony directors should be congratulated on the detail of information in the circular and the manner of its presentation. It is only unfortunate that such a statement is not automatic in these circumstances; it should not be necessary for shareholders to have to make complaints before action is taken.

The main arguments put forward for the acceptance of the proposals by the Harmony shareholders is twofold. Firstly, on a present value basis the financial gain to the company in selling the areas to Virginia is estimated to be at least £1,500,000. Secondly, Harmony simply cannot afford to let Virginia close down. This second argument is familiar in the context of the Far East Rand. As one mine closes down so the others are forced to carry an additional pumping load and additional costs in terms of township maintenance.

The problem of water is far greater in the Harmony area than it is elsewhere in the O.F.S. and it has been estimated that the mine would be forced, following the closure of Virginia, to pump an additional 6,000,000 gal. per day. This would add some £360,000 per annum to the working costs and would involve an additional capital expenditure of about £1,000,000.

In calculating the financial merits of the scheme the main considerations have been that the Harmony pay-limit is 5.4 dwt./ton, that the tonnage of the two areas in total is approximately 5,000,000 tons yielding 6.4 dwt./ton, and that it will probably be some 10 or 15 years before the northern and larger area of the two would be mined out. Considering these facts on a present value basis, even at a discount factor as low as 6 per cent as the Harmony directors have done, it certainly appears to be to the advantage of the Harmony shareholders to agree to the proposals.

From the point of view of the Virginia shareholders, any proposal which lengthened the life of their property must be considered to their advantage.

THE GROUP'S HOLDINGS

Not only has the shareholders' agitation forced Harmony and Virginia to give a good deal more technical information, it has also brought to light the groups' holdings in these companies. The shareholdings of companies like OFSITS and WRITS are disclosed annually with the report and accounts, but this is one of the few occasions that any actual holdings of the major houses have been disclosed.

Harmony has 18,000,000 shares in issue and the controlling group, Corner House, has a 22 per cent holding through Rand Mines, Central Mining and CHIC. The Anglo American group, through De Beers OFSITS and Anglo itself, has a 12 per cent holding and Gold Fields, through West Wits, Gold Fields Investment and the parent house an 8 per cent holding.

Anglo-Vaal is the parent group of the Virginia mine, yet its direct holding is disclosed as a mere 442,636 shares or 3.3 per cent. A further 437,657 shares are held by Middle Wits, of the Anglo-Vaal stable, but it seems that the whole Anglo-Vaal group investment cannot be more than about 7.5 per cent. In Merriespruit the Anglo-Vaal group has a holding of approximately 17 per cent.

As matters stand the groups would have had no alternative but to disclose this information in terms of Section 70 Quin. of the Companies Act 1926. The question which now arises is whether this information will be published as a matter of course when large deals are involved, or whether the groups will seek an amendment to the company law.

FROBISHER'S NEW ERA

Following the sale of the bulk of its assets to Ventures Ltd. on the basis of one Ventures share for each thirteen shares of Frobisher Ltd., the company was re-constituted on June 28, 1960.

The assets excluded from the sale were the exclusive oil rights over areas of approximately 5,000,000 acres in Kenya and some 47,000,000 acres in the Somali Republic, and $250,000 in cash.

The policy of the company is now to endeavour to interest major oil companies in the exploration of the concessions. The Sinclair Oil Company in association with others is at present conducting an extensive survey over an area of some 9,400,000 acres under an agreement whereby Frobisher retains a 6 per cent royalty interest. The work done to date has been largely of a preparatory nature but oil shows have been reported on an area adjacent to the Sinclair concession and a hole is currently being drilled in a portion of the Sinclair area itself.

The main problem which faces the new company now is whether it can find the necessary finances required to develop the large concession acreage through the exploration stage.

TANJONG PROFITS DOUBLED

Low cost producers are not normally best placed to take the maximum advantage of an increase in commodity price. Tanjong Tin Dredging, with working costs per cu. yard at 11.72 pence and working cost per ton at £154, must fall in this category; yet the profits have been increased from £91,212 to £186,822. Dividends for the year amounted to 4s. 1½d. and absorbed £187,808.

In their report the general managers anticipate that a satisfactory rate of production will be maintained throughout the current year and that the returns should be maintained. However, from the investors' standpoint, the prospects for the current year cannot really be assessed without a knowledge of the company's plans for the No. 1 dredge. This dredge was put on to a care and maintenance basis at the close of 1957, due to export control, and it would seem reasonable that this dredge should now be brought into operation again. It is to be presumed that the chairman, Mr. A. G. Glenister will refer to this dredge in his report to shareholders.

The final dividend has been declared at 5s. 6d.

OFF-SHORE DIAMOND DEPOSITS

Mining off-shore alluvial mineral deposits is becoming almost commonplace as the search for the world's mineral wealth is becoming more difficult. For example, dredging off the western coastline of Thailand for tin has been in progress for some years and is currently an area of further active prospecting.

A new company has now been formed to exploit the off-shore diamond deposits of South-West Africa. The £5,000,000 company, Marine Diamond Corporation, is to exploit the concession area which stretches 190 miles up the coast from Oranjemund to Luderitzbucht. This concession area has recently been the subject of protracted legal proceedings but it has now been defined as extending from the low water mark to three miles out to sea. Originally the owners, Suidwes Prospekteurders, had contended that the concession began at the high water mark, but this was vigorously contested by the Consolidated Diamond Mines (of the De Beers group) whose area adjoins the new concession.

It is believed that diamonds exist off-shore in similar quantities to those in the CDM area, but the main question which must arise is the quality of the stones, for if the proportion of gem stones is low the inherently higher cost of the off-shore operation will become a serious problem. At present about 90 per cent of the stones recovered at CDM are of gem grade and in 1960 some 919,852 carats were sold for about £15,225,000.

The Marine Diamond Corporation proposes to mine its off-shore concession using marine pumps driven into the gravel from floating equipment, the gravels being treated either on the "dredgers" or pumped ashore for treating there. One of the greatest problems however, will be the removal of overburden. Little is known of the overburden depth below the low water mark but during 1960 CDM stripped 7,500,000 cu. yd. of overburden to expose 2,900,000 cu. yd. of gravel which in turn realized some 930,000 carats. Even on shore, using modern earth moving equipment, this is a large problem, at sea it could be extremely difficult.

CONGO DIAMOND OUTPUT DOWN

The Forminière diamond output for the first six months of 1961 is well below the planned figure. Contrary to earlier circumstantial reports from Brussels, that production was almost back to normal by January, it was reported at the annual meeting that the diamonds produced totalled 22,261 carats against a planned output of 46,200 carats.

The chairman, M. Van Esbroeck, said that no more placer sites could be put into operation, though work had been resumed on a modest scale at six sites early this year. The productivity of the labour force had fallen off markedly and clandestine working of deposits and diamond smuggling had assumed very large proportions.

E.R.C.'S NEW ISSUE

A shareholder of East Rand Consolidated has sent a letter to all holders of more than 5,000 shares calling upon them to oppose the new share issue of one share at par (2s.) for every two shares held.

In his annual statement the chairman, Mr. C. J. Burns said that the additional capital was required in order to accelerate the diversification of the company's interests and reduce the dependence upon South African holdings. The additional capital will allow the company to extinguish its present overdraft (£21,127) and provide a surplus for any special commercial or industrial opportunities which may be offered.

WESTERN MINING IRON ORE PROSPECTS

Western Mining has announced that application has been made for a number of reserves in order to prospect for iron ore. The Western Australia State government is retaining ownership of the known high grade iron deposits but is encouraging private enterprise to prospect

London Market Highlights

The feature of mining markets this week was the inevitable setback that occurred in the tin section on Wednesday. It was not surprising that a reaction should develop after the recent strong advance, particularly in view of the strength that had been seen on Friday and on Monday of this week, following the International Tin Council's rather empty communiqué which as is hardly surprising seems to have been misinterpreted by the market. It may be that the I.T.C. has no option but to play its cards close to the chest for the time being but this is certainly no help to tin share investors.

On Tuesday, however, the Singapore demand began to falter and on Wednesday it virtually dried up. The East has been the driving force in the recent market advance and with local buyers reluctant to operate at present high price levels, the result was that Wednesday saw a sharp marking down of share prices throughout the list. Naturally, the recent popular favourites suffered most. Tronoh were hardest hit, dropping to only 80s. from a high point of 88s. 6d. which had been reached at one time on Monday with matters not being helped by some market disappointment over the latest interim. Sungei Besi also went into reverse, falling 3s. 6d. to 53s. 6d. and losses of 3s. were recorded in Ayer Hitam (55s.) and in Malayan (44s.). Only the investment companies remained unscathed, London Tin at 20s. 4½d. being helped by the strong assets position outlined in the chairman's statement.

South African gold shares stayed very subdued indeed. Price movements were few and far between and usually amounted to losses of a few pence. A weak spot developed in Free State Saaiplaas, however, with the June quarterly report which disclosed a disappointing ore reserve position and the decision to postpone the mine's expansion programme. As a result the shares were marked down 1s. 1½d. to 5s., although they later made a half-hearted rally to 5s. 3d. Wednesday brought the faintest signs of a better feeling in the market generally, a move which was rather vaguely connected with an improvement in gold shares on Wall Street. It found some expression here in prices of the finance issues. Among them, Gold Fields rose 1s. 3d. to 45s. 6d. with sentiment being impressed by the particularly good profit performance of several of the group's mines in the June quarter. Union Corporation also perked up with a rise of 9d. to 43s. 6d. and Central Mining remained firm at 31s. 6d. on the recent statement by the chairman which stressed the strong assets position and the fact that a high proportion of these assets are outside of Africa.

Rhodesian copper still showed no pronounced trend. Dealers were understandably reluctant to take a view one way or the other while the future of the Northern Rhodesian constitution was still in the balance. But there was a distinctly firm undertone to the share market even if this was not translated into price movements. The only share to show any real improvement was Nchanga which gained 1s. 9d. to 44s. 3d. ex-dividend in a further response to the recently maintained dividend.

for deposits not in this high-grade category.

The government has called for tenders for the exploitation of the high grade deposits and it has been announced that Western Mining has tendered to mine the Tallering deposits. No further news has been given of the company's earlier tender to mine the Dowd's Hill deposit in the Yilgarn district.

Nchanga Dividend Maintained.—The total net profit for the financial year ended March 31, 1961 has fallen to £12,450,128 compared with £13,643,764 for the previous year. The dividend has been maintained at 7s. 0d. per share. However, the appropriations to capital expenditure and general reserve have been reduced by £1,500,000.

Burma Mines.—The new foundation for the No. 1 winder and the repairs to its bedplate have been completed well ahead of schedule, and normal production was resumed on July 4, 1961.

Board Changes

Mr. M. I. Freeman has been appointed deputy chairman of Imperial Smelting Corporation, and Mr. H. V. Casson has been appointed a director.

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Mr. R. C. Atherton and Mr. W. W. Connor have been appointed directors of New Broken Hill Consolidated.

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Consolidated Zinc Corporation announce that Mr. A. M. Baer, the deputy chairman, having reached retirement age, is resigning from his executive positions with the subsidiary companies of the Consolidated Zinc Group. Mr. Baer will continue to be deputy chairman of the company.

NEW COAL MONTHLY

A new national monthly newspaper *Coal News*, has been launched by the National Coal Board and is being widely distributed among 760 collieries, as well as workshops, research stations and by-products plants. It is claimed to be the most ambitious industrial newspaper in Britain with four special pages of news and photographs for each of the nine coalfield divisions.

Coal News costs 3d., but only half of this goes towards printing costs. The remaining 1½d. is given to a good cause chosen by consultative committees. The first edition reports speeches made by Lord Robens, chairman of the N.C.B., and Mr. Sidney Ford, the National Union of Mineworkers' president, to the N.U.M. Conference at Rothesay, and carries a feature article on the prospects for more gas-from-coal plants in Britain.

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In our issue of May 19, 1961, p. 561, under the heading "Guinea Iron Ore Puzzle", we referred to certain apparently conflicting reports emanating from Guinea, of which we were unable to obtain any clarification in London. We have since been informed by Consafrique that they have signed with the Guinea government an exclusive contract for the prospection and development of the important iron deposits of the Nimba and Simandou Mountains. Consafrique is a consortium of European banks whose main partners are Hambros Bank, the Banque de l'Indochine and the Deutsche Bank. It has no connection with any of the other concerns which have been mentioned in relation to these deposits. While the extent of workable ores and reserves in this large area is as yet unknown, experts believe that there are many hundreds of million tonnes and that the iron content is high (around 65 per cent).

Publications Received

The Platinum Metals are the subject of Mineral Report 3 issued by the Mineral Resources Division, Department of Mines and Technical Surveys, Ottawa, (price $1). The author is C. C. Allen. Annual production of the platinum metals is now about 1,000,000 troy oz of which Canada accounts for about a third, its output being derived as a by-product of nickel-copper metallurgy. This 68 page survey covers all aspects of the platinum industry in a world context and contains many illustrations. Its seven chapters are devoted respectively to history, mineralogy and occurrences, extraction and refining, physical and chemical properties, consumption and uses, marketing and prices, and world production. A selected bibliography is also included and the publication is well indexed.

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The Mineral Resources Division of the Canadian Department of Mines and Technical Surveys, Ottawa, has issued its series of Operatirs' Lists for 1960, covering mines and mineral processing plants in Canada. The list published under various sub-headings: *Metallurgical Works in Canada* includes, Part I Primary Iron and Steel, and Part II, Non-Ferrous and Precious Metals. List 2, entitled *Metal and Industrial Mineral Mines in Canada*, contains the metal mines, grouped according to the principal metals recovered. List 3, under the heading *Milling Plants in Canada*, gives Metallic Ores in Part I and Milling Plants processing non-metallic substances in List II. *Coal Mines in Canada* are listed in Operators List 4. List 7, *Natural Gas Processing Plants* in Canada, is the first edition of a list devoted entirely to natural gas processing plants. All these booklets are available from the Mines Branch Distribution Office, Ottawa, price 25 cents each.

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The constant upward spiral in the value of annual production achieved by Ontario's mining industry during the last few years, was continued in 1960, when the total set a new all-time record of more than $984,000,000. The Review of the Ontario Department of Mines, for the past year, published under the title *Barometer Rising 1960*, is an account of the year's progress. Part I of this book deals with the industry itself, and Part II with the activities of the Mining Department. Summaries of prospecting and exploratory work are included, and the progress of the major mining companies is reported. The whole book is attractively illustrated, and provided with maps charts and graphs.

Obituary

SIR JOSEPH BALL

We regret to announce the death of Sir Joseph Ball, K.B.E., in London on July 10 at the age of 75. George Joseph Ball was born in Salisbury, Wilts., in 1885, and was educated in London. He was called to the Bar in 1913, and after working as a civilian official of Scotland Yard, he served in the First World War, in M.I.5.

He joined the Conservative Central Office in 1920, and was appointed first director of the party's research department when it was established in 1930, a position which he held from 1930-39.

Sir Joseph received the O.B.E., and was created K.B.E. in 1936. In the Second World War he served from 1940 to 1942 as deputy chairman of the Security Executive.

Sir Joseph Ball's business career embraced many fields of activity; he was managing director of Henderson's Transvaal Estates from 1944 to 1956, having been a director of the company for thirty years. At the time of his death, in addition to his chairmanship of Henderson's Transvaal, he was chairman of Lake View and Star, Tweefontein Investments, Malaysiam Tin and Mineral Holdings. Other positions held at the time of his death included directorships of Consolidated Gold Fields of South Africa, Coronation Syndicate, Arcturus Mines and Homestake Gold Mines; he was also a member of the London Committee of Daggafontein Mines.

MR. EDGAR LLEWELLYN LLOYD

We regret to report the death of Mr. Edgar Llewellyn Lloyd, a director and manager of General Mining & Finance Co. at Melrose, Johannesburg, at the age of 59. Mr. Lloyd was born in Grahamstown, South Africa, and after leaving school qualified as a chartered accountant. His first position was with Union Corporation, and he left in 1949 to join General Mining & Finance Corporation. Mr. Lloyd, who was also a director of several other companies, leaves a widow and two children.

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Johnson Matthey are now able to offer sample quantities of gallium arsenide in polycrystalline form. It is hoped that single-crystal material will also be available shortly. The material can be supplied either as broken ingot or cut slices.

LONDON TIN CORPORATION

NEED FOR FRESH THINKING ON THE TIN POSITION

SIR DOUGLAS WARING'S STATEMENT

The Thirty-fifth Annual General Meeting of London Tin Corporation Limited will be held on July 14 at The Chartered Insurance Institute, 20, Aldermanbury, London, E.C.

The following is an extract from the statement by **Sir Douglas Waring, C.B.E.** (the chairman), which has been circulated to Shareholders:—

The Corporation's net profit for the year ended March 31, 1961, after providing for taxation, was £1,006,369 compared with £598,943 for the previous year.

The dividends paid (35% against 25%) took £775,660, leaving a balance of £230,709, which raised the balance on profit and loss account to £663,804. The sum of £300,000 has been transferred to General Reserve leaving £333,804 to be carried forward.

The substantial increase in our income was due in the main to the higher dividends received during the year from our tin investments, as a result of increases in exports allowed by the International Tin Council.

Capitalization Proposals

The Capital Reserve now stands at £200,000 and the General Reserve at £1,500,000. The Directors propose that the whole of the Capital Reserve and part of the General Reserve should be capitalized and that shareholders should receive one new fully paid ordinary share for every 5 ordinary shares held.

Investment Portfolio

The investments held by the Corporation and its wholly-owned subsidiaries, consist, to the extent of 79.2% of book cost, in shares in the leading tin mining companies.

The remainder of the portfolio comprises equity holdings in Commercial and Industrial Undertakings, other minerals including Oil, Public Utilities and Trust Companies. This forms a useful counterbalance to fluctuations which are inevitably connected with the Tin Mining Industry and it can be expanded as and when suitable opportunities occur.

The market value of the Investments shows a considerable increase as against the previous year.

The Tin Position

Free world consumption of Tin in 1960 was the highest ever recorded. The latest revised figures issued by The International Tin Council show a total for that year of 169,000 tons of metal excluding the Sino-Soviet countries. A change is apparent in the pattern of world consumption. Demand has increased from the Continent of Europe and from Japan reflecting the industrial upsurge which is gaining momentum in the countries most severely devastated in the World War of 1939 to 1945, whilst the gradual emergence since that time of some of the lesser developed countries is now creating a new demand for Tin which must increase as they progress, especially because by far the largest end-use for tin is tinplate.

Free world mine production in 1960 was reported at 135,000 tons of metal. Exports from the main producing countries which are signatories to the International Tin Agreement, and the stocks they were allowed to build up, were controlled for the first three quarters of the year. Thereafter all controls were lifted. Since then, production, particularly in Bolivia and Indonesia, has not increased, and supplies from the Republic of Congo have been interrupted. Meanwhile demand for Tin has continued at a high rate.

The price of Cash Tin in London, which averaged £796 per ton in 1960 had reached £830 by early April, 1961. In June it reached £880 per ton, the price at which the Buffer Stock Manager of the International Tin Council was bound to sell, and the whole of the Buffer Stock of Tin was quickly exhausted. Since then the price had advanced to a substantially higher level, and demand continues strong.

At the time of the preparation of this statement, the International Tin Council is in session, and no doubt the whole position of estimated future production and consumption will be under review. In particular the inability of some producing countries to increase exports during a period of nine months free from Control must call for close attention, and it is pertinent to raise the question as to whether the price range agreed by the Council in the past is, as a whole, a realistic one in the light of present day conditions. Exactly a year ago this matter was discussed exhaustively by producer and consumer delegations at the United Nations Conference on Tin in New York and the delegation for Bolivia, which pre-war was for many years the second largest producer of Tin in the World, made it clear that the existing price range of £730 to £880 a ton was uneconomic to the mining industry of that country. So long as world production exceeded demand it was understandable that consumer delegations should remain unresponsive even if they were sympathetic, but fresh thinking now seems necessary and the problem should be re-examined on a long term basis especially because, in spite of intensive prospecting, no new large fields of tin have been located in the free-world as we know it for the past thirty years or more.

The Ubiquitous Tin Can

In this context it is of course relevant to raise the question of substitution of other materials in place of Tin if the price of the metal were to rise too steeply. As I have already mentioned, the main outlet for tin is tinplate. The total quantity produced in 1960 was a record of 8,640,000 long tons, which is an increase of 1¼ million tons over the figure for 1959. Most of it is used in the manufacture of the ubiquitous tin can. The governing factor in the cost of materials used in the manufacture of tinplate is the price of steel and not the price of tin. The weight of a standard basis box of electrolytic tinplate in the U.K. is 108 lbs. Of this weight 107½ lbs. is steel and ½ lb. is tin. From this quantity of tinplate about 500 cans of a popular size are made by the can manufacturers. With Tin at £880 per ton, namely the ceiling of the price range under the 1954 International Tin Agreement, the cost of the tin in a basis box is 3/11¼d. which is equivalent to 0.095 pence per can. A rise in the price of tin by £100 above the ceiling would account for an increase in the cost of the use of this material by about one hundredth of a penny per can. Therefore, whilst accepting the fact that there is very keen competition over various forms of packaging which makes the can manufacturer alive to every aspect of his cost I hope that the figures which I have quoted might tend to dispose of any argument that the price of the tin element is the deciding factor in the cost of the tin container against the cost of some other type of substitute.

I would have thought that a matter of far greater concern was the assurance of future supplies of tin by means of production on a long term basis and it is probable that too little attention in the past has been paid to this in a practical manner at the level of the International Tin Council. Even in the case of Malaya, which is the world's largest and cheapest producer of Tin, we are continually reminded by spokesmen of the Industry and by Government mining officials that the future must rest in the working of lower grade deposits by large capacity plants. This is a challenge which the Malayan miners will I know readily accept and are capable of meeting, but as the cost of these plants is now in the order of 1¼ million pounds sterling per dredge it is necessary to be reasonably assured of a future Tin price range which in the long term will allow for amortization over the definite limited life of an alluvial property and an economic return on the capital to be provided.

In spite of the probable shortfall in tin supplies this year, I have no doubt that in the long term the producing countries—given fair prices—will, between them, be able to meet all the demands of the consuming countries.

GENERAL: The outlook for Tin in the current year appears to be good, and on that basis our income for the year to March 31, 1962 will probably show an increase over that recorded in the accounts under review. It is however too early in the current year to make any reliable estimate of dividends to be received, and it is not possible to predict financial policy and other considerations affecting the distributions of individual mining companies which constitute our revenue. If no adverse conditions arise, we would hope to be able to maintain the existing rate of dividend on the increased capital proposed.